

ALGEBRA — MODEL NO 1**[Q1] A) Choose the correct answer:**(1) If $\{3, 6\} = \{x + 1, 3\}$ then $x = \dots\dots\dots$

- a) 2 b) 3 c) 4 d) 5

(2) If $y \propto x$ and $y = 2$ when $x = 6$, then $y = \dots\dots\dots$ when $x = 2$

- a) $\frac{1}{3}$ b) $\frac{2}{3}$ c) $\frac{3}{2}$ d) 3

(3) If the range of set of the values is 9 and the highest value is 15, then the lowest value is $\dots\dots\dots$

- a) 24 b) 18 c) 6 d) 3

[B] If $X - Y = \{3\}$, $Y - X = \{1, 5\}$, $X \cap Y = \{6\}$ **Find:****① X, Y** **② $(X \cap Y) \times X$** **[Q2] A) Choose the correct answer:**(1) 27 months : 3 years = $\dots\dots\dots$: $\dots\dots\dots$ in the simplest form

- a) 9 : 1 b) 1 : 9 c) 3 : 4 d) 9 : 10

(2) The S.S. of the $\sqrt{x^2} = 4$ in R

- a) $\{2, -2\}$ b) $\{4, -4\}$ c) $\{16, -16\}$ d) $\{4\}$

(3) If $X = [-4, 2]$, $Y = [-2, 5]$, then $(3, -3) \in \dots\dots\dots$

- a) $X \times Y$ b) $Y \times X$ c) X^2 d) Y^2

[B] If a, b, c, d are in continued proportional. Prove that:

$$\frac{c^2 - d^2}{a - c} = \frac{bd}{a}$$

[Q3] [A] If $f(x) = x^2 - 3x$, $g(x) = x - 3$ Find:

① $f(\sqrt{2}) + 3g(\sqrt{2})$

② All values of x which make $f(x) = g(x)$

[B] If $X = \{-1, 0, \frac{1}{2}, 2\}$ and R is a relation on X where $a R b$ means "a is the multiplicative inverse of b" for each of $a \in X, b \in X$. write R and show with reason if R is a function or not?

[Q4] [A] If $y = a - 9$ and $y \propto \frac{1}{x^2}$ and $a = 18$ when $x = \frac{3}{2}$ Find:

① The relation between y and x

② The value of y when $x = 1$

[B] Through the interest of the Egyptian authorities with the villages, if the ratio between lengths of two roads is $2 : 5$, and the difference between them is 21 Km.

① Calculate the length of them in kilometer.

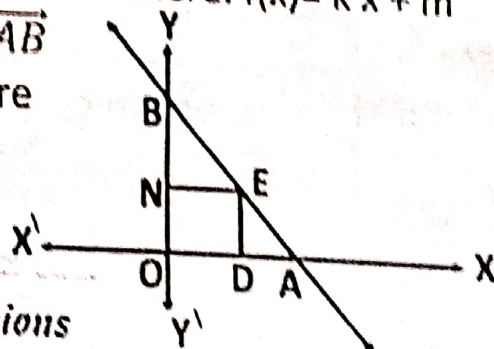
② If the cost of paving 1 Km. is 2 million Egyptian pounds, find the total cost of paving the two roads?

[Q5] [A] Calculate the standard deviation of the set of values: 5, 6, 7, 8 and 9

[B] In the opposite figure: the linear function f where: $f(x) = kx + m$ represent graphically by straight line \overline{AB} where $A(3,0)$, $B(0,6)$, ONHD is square

① Write the rule of function f ?

② Find the area of square ONHD?



End of the questions

ALGEBRA – MODEL NO 2

[Q1] A) Choose the correct answer:

- (1) The range of the values 7, 3, 6, 9, 5 equals
 a) 3 b) 4 c) 6 d) 12
- (2) $a : b = a^2$; , $a \neq b \neq \text{zero}$
 a) b^2 b) $a b$ c) $a^2 b$ d) $a b^2$
- (3) If $X = [0, 5]$, $Y = [-3, 2]$, then $(-2, 4) \in$
 a) X^2 b) Y^2 c) $X \times Y$ d) $Y \times X$

B): If b is mean proportion between a, c Prove that: $\frac{a^2 + b^2}{b^2 + c^2} = \frac{a}{c}$ **[Q2] A) Choose the correct answer:**

- (1) The relation represents inverse variation between Y, X is
 a) $Y = 5X$ b) $\frac{x}{5} = \frac{4}{y}$ c) $\frac{x}{5} = \frac{y}{3}$ d) $Y = X + 3$
- (2) If $X = \{1, 2, 3\}$, $R = \{ (a, b) : a \in X, b \in Y \}$ then number of elements in R equals
 a) 12 b) 9 c) 6 d) 3
- (3) If the curve of the function $\mathcal{F} : \mathcal{F}(x) = x^2 + b x - 3$ cut form negative part of X -axis only one units, then $b =$
 a) b) c) d)

B): If $(\sqrt{x-1}, 11) = (4, Y+3)$, find the value of $\sqrt{x+y}$

[Q3]

A) If $\mathcal{F}: \mathcal{F}(x) = X^2 + bX + c$, and $\mathcal{F}(2) = 2$ when $X \in \{0, 3\}$. Find the value of b, c .

B) Find the standard deviation for the values 5, 7, 8, 14, 16

[Q4]

A) If $X = \{-1, 0, 1\}$, and \mathcal{R} is a relation on X where $a \mathcal{R} b$ means " $b = a^2$ " for $a, b \in X$:

- ① Write \mathcal{R} and represents it by arrow diagram
 - ② Is \mathcal{R} function or not? If \mathcal{R} is a function, find its range.
-

B) If $\frac{x}{3} = \frac{y}{4} = \frac{z}{5}$, prove that: $\frac{2y-z}{3x-2y+z} = \frac{1}{2}$

[Q5]

A) If $\mathcal{F}: \mathcal{F}(x) = aX^2 + 5X + 7$, if linear function, find the value of a then find $\mathcal{F}(-1)$.

B) If the weight of a body on the moon (W) is directly proportional with its weight on the ground (R), if the body weight 84 kg, on the ground and its weight on the moon is 14 kg. What will its weight be on the moon if its weight on the ground 144 kg?

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End of the questions

ALGEBRA – MODEL No 3**[Q1] A) Choose the correct answer:**

- (1) If the point $(X-3, 2-X)$ lies in fourth quadrant, then $X = \dots\dots\dots$
 a) 4 b) 3 c) 2 d) 1
- (2) If $\mathcal{F}(x) = KX + 8$, $\mathcal{F}(2) = \text{zero}$, then $K = \dots\dots\dots$
 a) 8 b) 6 c) 4 d) -4
- (3) If $a, 2, 4, b$ are in continued proportion, then $a + b = \dots\dots\dots$
 a) 2 b) 4 c) 6 d) 9

B): If b is mean proportion between a, c Prove that:
$$\frac{2c^2 - 3b^2}{2b^2 - 3a^2} = \frac{c}{a}$$
[Q2] A) Choose the correct answer:

- (1) If $Y \propto X, Y \propto \frac{1}{z}$, then $Y \propto \dots\dots\dots$
 a) XZ b) $\frac{z}{x}$ c) $\frac{x}{z}$ d) X^2z
- (2) The standard deviation of the values $5, 5, 5, 5$ is
 a) Zero b) 5 c) 6 d) 2
- (3) The function $F(x) = X^2 - (X-3)^2$ of degree
 a) Zero b) First c) Second d) Third

B): The point $(-1, 2)$ is the vertex of the curve $\mathcal{F}(x) = aX^2 - 6x + c$.
find the value of C

3]

If $3a = 4b = 6c$, find $a : b : c$ then find the numerical value of the expression $\frac{3a+2b}{a+4c}$

If $X = \{-2, -1, 0, 1, 2\}$, and R is a relation on X where $a R b$ means " a is additive invers of b " for $a, b \in X$;

① Write R and represents it by arrow diagram

② Is R function or not? Give reason.

4]

If $X = Z + 8$, Z varies inverse with Y and $Z = 2$ when $Y = 3$. Find the relation between X, Y then find the value of Y when $X = 3$

If $F(x) = 2x + 5$, $G(x) = x - 6$. Prove that $F(2) + 3G(3) = 0$

25]

1) Find the arithmetic mean and standard deviation for the values $5, 7, 8, 9, 6$

2) If $(X - 2, 2^{Y-1}) = (3, 1)$, find the value of X, Y

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End of the questions

ALGEBRA — MODEL NO 4

[Q1] A) Choose the correct answer:

(1) If $5X = 9Y$, then $\frac{3X}{2Y} = \dots\dots\dots$

- a) $27 : 10$ b) $9 : 5$ c) $5 : 9$ d) $81 : 25$

(2) The opposite figure

Represents a curve of quadratic function,

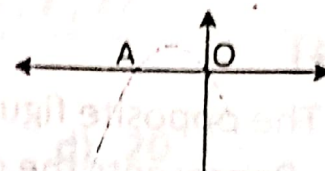
If point A $(-4, 0)$, then the equation ofLine of symmetry is $X = \dots\dots\dots$

- a) 1 b) -1 c) -2 d) Zero

(3) The number that it is added to each of the numbers 1, 3, 6 it becomes proportional is $\dots\dots\dots$

- a) 4 b) 3 c) 2 d) 1

B): If B is mean proportional between A, C.

Prove that: $\frac{a^2}{b^2} + \frac{b^2}{c^2} = \frac{2a}{c}$ 

[Q2] A) Choose the correct answer:

(1) If $\mathcal{F}(X+3) = X-3$, then $\mathcal{F}(7) = \dots\dots\dots$

- a) 4 b) 1 c) 7 d) 10

(2) If $\sum(X - \bar{X})^2 = 36$ for nine of the values, then the standard deviation equals $\dots\dots\dots$

- a) 2 b) 18 c) 27 d) 4

(3) If $\mathcal{F}(x) = 3$, then $\mathcal{F}(2) - \mathcal{F}(7) = \dots\dots\dots$

- a) 5 b) -5 c) Zero d) -4

B): If $X = \{4, 5, 7\}$ and \mathcal{R} is function on X and $\mathcal{R} = \{(a, 5), (b, 5), (4, 7)\}$ ① Find the numerical value of $3a + 2b$

② The range of the function

3]

If $\frac{a}{4x+y} = \frac{b}{x-4y}$, prove that: $\frac{a+b}{5x-3y} = \frac{a-b}{3x+5y}$

Find the standard deviation for the values: 12, 13, 16, 18, 21

4]

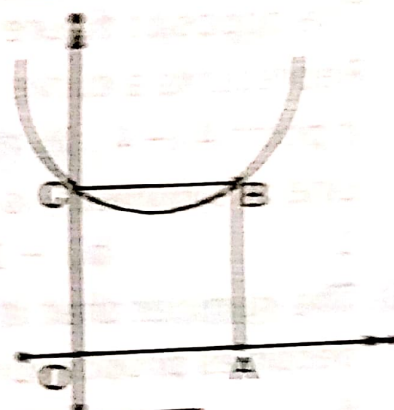
The opposite figure:

Represents the quadratic function

$$f: f(x) = x^2 - (k-2)x - k + 4$$

If ABCO is a square

Find the value of K



If $Y = 1 + b$ where b varies inverse with square of X , and $X = 1$ where $Y = 5$. Find the relation between X , Y then find the value of Y when $X = 2$

25]

1) If $f(x) = a + x^2$, $g(x) = c$ are two polynomial function where a, c are two constant and $3f(2) + 3g(x) = 6$, find the numerical value of $2f(9) + 2g(7)$

3) If $X = \{3, 5, 7\}$, $Y = \{x: x \in \mathbb{N}, 10 < x < 30\}$ and the function f from $X \rightarrow Y$ where $f = \{(3,9), (5,15), (7,21)\}$
Find: ① The domain of f ② Write the rule of f

End of the questions

ALGEBRA – MODEL No 5

[Q1] A) Choose the correct answer:

(1) Which of the following sets is the greatest Dispersion

- a) 28 , 17 , 30 , 36 , 40 c) 30 , 35 , 27 , 36 , 40
b) 20 , 37 , 18 , 41 , 26 d) 25 , 40 , 18 , 7 , 27

(2) If : $f(x-4) = x+3$, then $f(3) = \dots\dots\dots$

- a) 5 b) 6 c) 10 d) 20

(3) If : $a \in x^2$ where $X = \{x : x \in \mathbb{N}, 5 < x < 7\}$

- a) 36 b) $\{36\}$ c) $(6, 6)$ d) $[5, 7]$

[B] If a , b , c , d are in continued proportion prove that :

$$\frac{a=2b}{b=2c} = \frac{3b=4c}{3c=4d}$$

[Q2] A) Choose the correct answer:

(1) If a , 3 , b , 5 are in proportion then $5a - 3b + 4 = \dots\dots\dots$

- a) 3 b) 4 c) 5 d) 6

(2) Which of the following is direct variation between X, Y

- a) $XY = 5$ b) $\frac{X}{5} = \frac{Y}{3}$ c) $Y = X + 3$ d) $\frac{X}{5} = \frac{4}{Y}$

(3) If $f(x) = x^{k+3} + 2k$ is polynomial of second degree , k is constant then $f(2) = \dots\dots\dots$

- a) 2 b) 4 c) -1 d) 10

[B] Calculate the mean and the standard deviation for the following data { 7 , 12 , 6 , 15 , 10 }

Q3]

- A) if $X = \{1, 2, 3\}$, $Y = \{0, 1, 2, 3, 4\}$ and R is the relation from X to Y where $a R b$ means " $b - a = 1$ " for each $a \in X$, $b \in Y$. Write R and represent it by arrow diagram. Is R a function? and why?

B) If $\frac{x+y}{5} = \frac{y+z}{8} = \frac{z+x}{7}$ prove that $x : y : z = 2 : 3 : 5$

Q4]

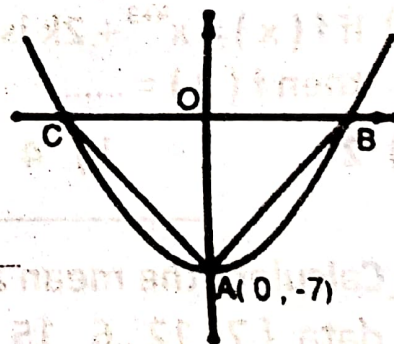
- A) if the curve of the function $f : \mathbb{R} \rightarrow \mathbb{R}$ where $F(x) = m - x^2$ intersect x -axis at $(-2, k)$ find the value of $m^k + 2m$

- B) Two integer numbers, the ratio between them is $2 : 3$ and if we add to the first 7 and subtract from the second 12 the ratio between them become $5 : 3$ find the two numbers?

[Q5]

- A) if $Y = a - 9$, $Y \propto \frac{1}{x^2}$, and $a = 18$ when $x = \frac{2}{3}$ find the relation between x and Y find Y when $x = 1$

- B) In the opposite figure :
 $F(x) = Lx^2 - 7$, area of triangle
 $ABC = 21 \text{ cm}$, $A(0, -7)$
 Find coordinates of b and c then find L



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 End of the questions

ALGEBRA – MODEL No**6****Q1] A) Choose the correct answer:**

- 1) If 4, 6, k are in proportion then $k = \dots\dots$
 a) 10 b) 9 c) 2 d) 24
- 2) If $a < 0$, $b > 0$ then the point Lies in third quadrant
 a) (a, b) b) (-a, b) c) (a, -b) d) (-a, -b)
- 3) If $f: f(x) = x - 5$, and $\frac{1}{2}f(a) = 3$ then $a = \dots\dots$
 a) 2 b) 8 c) 11 d) 16

B): If $4a^2b^2 - 12ab + 9 = 0$ prove that $a \propto \frac{1}{b}$

Q2] A) Choose the correct answer:

- (1) If $f(2x) = 4$, then $f(-x) = \dots\dots\dots$
 a) -2 b) -4 c) 4 d) 2
- (2) If: $(X - Y) \times Y = \{(1, 2), (1, 3)\}$, $n(X \times Y) = 6$ then $X = \dots\dots\dots$
 a) {1} b) {1, 2} c) {1, 3, 6} d) {1, 3, 2}
- (3) If $5y + 4x = 2$, $y \propto (1 - 2x)$ then the proportion constant is ...
 a) $\frac{2}{5}$ b) $\frac{1}{5}$ c) $\frac{3}{5}$ d) $\frac{4}{5}$

B):

If: $\frac{x+y}{3} = \frac{y+z}{8} = \frac{z+x}{6}$ prove that $\frac{x+y+z}{2x+3y+3z} = \frac{17}{50}$

Q3]

A) if $X = \{-3, -2, -1, 0, 1, 2, 3\}$, $Y = [0, 9[$ and \mathcal{R} is the relation from X to Y where $a \mathcal{R} b$ means " $a^2 = b$ " for each $a \in X$, $b \in Y$. Write \mathcal{R} and represent it by arrow diagram. Is \mathcal{R} a function? and why?

B) If: $\frac{a}{b} = \frac{2}{3}$, $\frac{a}{c} = \frac{3}{5}$, $a + b + c = 75$ find the value of each a, b, c ?

[Q4]

A) If: $F(x) = x^{k-3} + x^{4-k}$ is polynomial where $k \in \mathbb{N}$ find $k, f(1)$

B) the following are frequency distribution for a number of excellent pupils in 10 Dakahlia prep school. Calculate the mean and the standard deviation

Excellent pupils	4	6	8	5	Total
Number of school	1	2	3	4	10

[Q5]

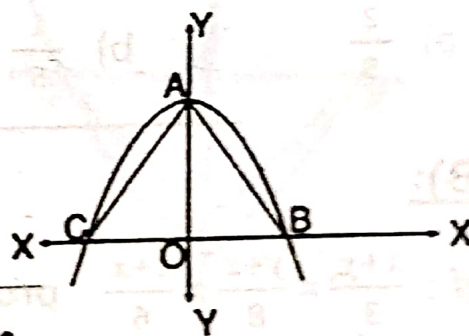
A) If $Y = K + M$ where k is constant, $m \propto x$, $y = 3$ when $x = 0$, $y = 5$ when $x = 3$. Find the relation between x and y . find y when $x = 7$

B) In the opposite figure:

$$f(x) = -kx^2 - (k-5)x + 4k,$$

If y -axis is the axis of symmetry,

Find k , area of triangle ABC



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End of the questions

ALGEBRA – MODEL No

7

[Q1] A) Choose the correct answer:

(1) The simplest measure of dispersions is

- a) Range b) Mode c) Mean d) Standard deviation

(2) If $3x \cdot y = 10$ then $x \propto$

- a) y^2 b) $\frac{1}{y^2}$ c) y d) $\frac{1}{y}$

(3) If $x^2 = \{(3k - 4, k)\}$, $y = \{1, 7\}$ which of the following belongs to $x \times y$

- a) (4, 1) b) (3, 1) c) (2, 1) d) (3, 7)

B): Calculate the mean and the standard deviation for the following data $\{5, 16, 20, 27, 32\}$

[Q2] A) Choose the correct answer:

(1) If $f(x) = 3x + 5$, $m + n = 9$ then $f(m) + f(n) =$

- a) 14 b) 27 c) 32 d) 37

(2) If a, b, c are in proportion then $a^2 : b^2 =$

- a) $a : c$ b) $a : b$ c) $c : a$ d) $b : a$

(3) If $f(x) = nx^2 + 3x^n - 5$ polynomial in second degree then $n \in$

- a) $\{2, 3\}$ b) $\{-1, 1\}$ c) $\{1, 2\}$ d) $\{0, 1, 2\}$

B): If $\frac{x}{a-b+c} = \frac{y}{b-c+a} = \frac{z}{c-a+b}$ prove that $\frac{x+y}{y+z} = \frac{a}{b}$

[Q3]

- A) if $X = \{1, 2, 4, 6, 10\}$, and R is the relation on X where $a R b$ means "a is multiple of b" for each $a, b \in X$. Write R and represent it by arrow diagram and Cartesian diagram.
 Is R a function? and why?

- B) If $\frac{a}{b} = \frac{2}{3}$, $\frac{a}{c} = \frac{3}{5}$, $a + b + c = 75$ find the value of each a, b, c

[Q4]

- A) If $f(x) = 5x - k$, $g(x) = x - 2k$ where k is constant,
 $f(1) + g(3) = -7$, find $f(3) + g(1)$

- B) If $Y = 3 + a$, $a \propto \frac{1}{x}$, and $Y = 5$ when $x = 1$

- ① Find the relation between x and Y ② Find Y when $x = 2$

[Q5]

- A) If $\frac{21x - y}{7x - z} = \frac{y}{z}$ Prove that y varies directly with z where $x \neq 0$

- B) In the opposite figure:

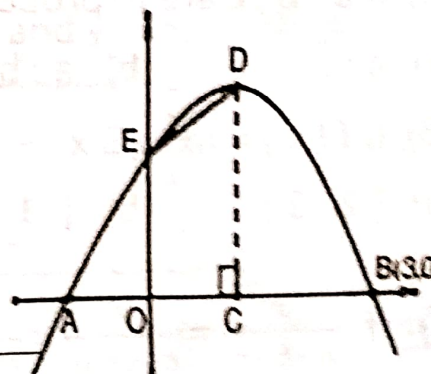
$f(x) = -kx^2$ where D is the vertex,

$B(3, 0)$

① Find k ,

② The maximum value

③ Area of the shape $DCOE$



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 End of the questions

ALGEBRA — MODEL No

8

1) Choose the correct answer:

If the point (a, b) lies in fourth quadrant, the point $(5^a, 2^b)$ lies in the quadrant

a) First b) Second c) Third d) Fourth

If $X = \{-1\}$, $n(X) + n(Y) = 1$, then $X \times Y = \dots\dots\dots$

a) Zero b) $\{(-1, -1)\}$ c) \emptyset d) $\{(1, -1)\}$

If $\frac{a}{b} = \frac{2}{3}$, $\frac{a}{c} = \frac{3}{5}$, then $a : (b + c) = \dots\dots\dots$

a) 1 : 8 b) 2 : 5 c) 6 : 19 d) 19 : 15

Find the arithmetic mean and the standard deviation for values 8, 9, 7, 6, 5

A) Choose the correct answer:

If $(a, 4)$ is on the graph of the function $G: \mathbb{R} \rightarrow \mathbb{R}$, $G(x) = 2x + b$, then $6a + 3b = \dots\dots\dots$

a) 12 b) 9 c) 6 d) 3

If $4a^2 + 9b^2 = 12ab$, then $\frac{a}{b} = \dots\dots\dots$

a) $\frac{2}{3}$ b) $-\frac{2}{3}$ c) $\frac{3}{2}$ d) $-\frac{3}{2}$

If $XY^5 = \text{Constant}$, then X varies inversely with

a) $\frac{1}{5}$ b) Y^5 c) Y d) Y^2

If $\frac{x+y}{3} = \frac{y+z}{8} = \frac{z+x}{6}$, find the value of $\frac{x+y+z}{2x+3y+3z}$

[Q3]

- [A] If $X = \{-2, 2, 5\}$, $Y = \{3, 7, K\}$, and R is Function from X to Y where $a R b$ means " $b = a^2 - 1$, for $a \in X, b \in Y$ "
Find the value of K and represents it by arrow diagram

- [B] If a, b, c, d are in continued proportion

Prove that: $\left(\frac{a+b}{b+c}\right)^3 = \frac{a}{d}$

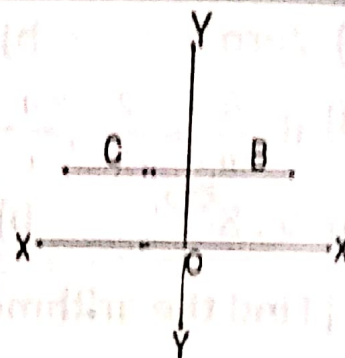
- [Q4] [A] In the opposite figure:

$F: R \rightarrow R,$

$F(x) = (m-3)x^2 + (2-K)x + 2K + 3m$

Represents by \overline{BC} , $\overline{BC} \parallel X$ -axis, $K, m \in R$.

Find $F(7) + F(3)$



- [B] If $Y = 3 + a$, $a \propto \frac{1}{x}$, and $Y = 5$ at $X = 1$

Find the relation between X, Y , then Find Y at $X = 2$

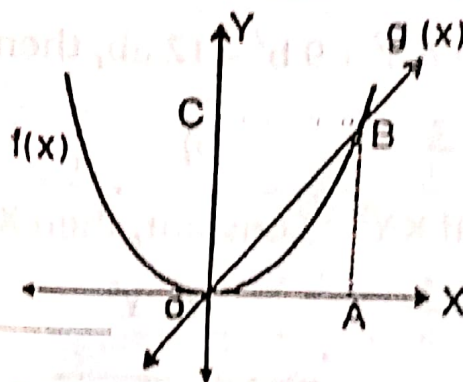
- [Q5] [A] If $2a = 3b = 4c$, find the value of $\frac{a^2 + b^2 + c^2}{a(b+c)}$

- [B] In the opposite figure

The curve represents $f(x) = x^2$

\overline{OB} represents $g(x) = 3x$

Find the area of rectangle OABC



End of the questions

ALGEBRA – MODEL NO 9**A) Choose the correct answer:**

If all values are equal, then

a) $X - \bar{X} > 0$ b) $X - \bar{X} < 0$ c) $\sigma = 0$ d) $\bar{X} = 0$

If the point $(x-4, 2-x)$ lies in third quadrant, then $x \in \dots$

a) $[2, 4]$ b) $]2, 4[$ c) $[-4, -2]$ d) $] -4, -2[$

If $\frac{y+3}{y} = \frac{x+3}{x}$, $x \neq y \neq 0$, then

a) $Y \propto X$ b) $Y \propto \frac{1}{X}$ c) $Y \propto X+2$ d) $Y \propto X+5$

Find the arithmetic mean and the standard deviation for values
73, 54, 62, 71, 60**2) A) Choose the correct answer:**1) If the straight line $X = 2$ is line of symmetry for $F(x) = X^2 + Kx + 4$, then $K = \dots$

a) -4 b) -2 c) 2 d) 4

(2) If $\frac{a}{b} = \frac{b}{c} = \frac{c}{d}$, then $\frac{a}{d} = \dots$

a) 5×2^2 b) 40 c) 10 d) 2×5^2

(3) If X, Y are two sets where $X \cap Y = \{2\}$, then $(X \times Y) \cap (Y \times X) = \dots$

a) 4 b) $\{4\}$ c) $\{2, 2\}$ d) $\{(2, 2)\}$

[B] IF $\frac{2x}{3} = \frac{3y}{2} = \frac{5z}{4}$, find the value of $\frac{2x+3y+5z}{6x+6y+10z}$

Q3]

A) If $X = \{-2, -1, 0, 1, 2\}$, and \mathcal{R} is relation on X where $a \mathcal{R} b$ means " $a + b = \text{Zero}$, for $a \in X, b \in X$

① Write \mathcal{R} and represents it with arrow diagram

② is \mathcal{R} function or not? Give reason

B) If the positive values: $5a, 6b, 7c, 8d$ are in continued

proportion, prove that: $\sqrt[3]{\frac{5a}{8d}} = \sqrt{\frac{5a+6b}{7c+8d}}$

Q4]

A) If $f(x) = 2x + K$, $g(x) = x^2 + K$ and $f(2) + g(-4) = 30$

Find $f(-2) + g(2)$

B) If $Y = a - 1$, $a \propto \frac{1}{x^2}$ find the relation between X, Y where $a = 4$ at $X = 2$. Find the value of X at $Y = 8$

Q5]

A) If $\frac{21x-y}{7x-z} = \frac{y}{z}$, prove that: $Y \propto Z$

B) In the opposite figure:

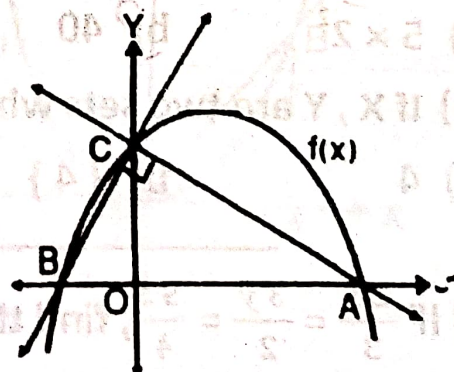
The curve represents

$$f(x) = -\frac{1}{3}x^2 + Kx + m$$

If $\overline{AC} \perp \overline{BC}$, $OC = 3$ units, $OA = 9$ OB

① Find the value of K, m

② Find the area of $\triangle ABC$



◆◆◆
End of the questions

ALGEBRA — MODEL NO

10

[Q1] A) Choose the correct answer:(1) If the point A ($X-5$, $X-3$) lies on X-axis, then A =

- a) (0 , 2) b) (2 , 0) c) (- 2 , 0) d) (0 , - 2)

(2) The following function are polynomials except: $F(x) =$

- a)
- $X+3$
- b)
- $X(X+\frac{1}{x})$
- c)
- $\sqrt{2} X+3$
- d)
- $X^2(X+4)$

(3) If the range of values 7 , 3 , 6 , K , 5 is 6, then K =

- a) 3 b) 6 c) 9 d) 12

[B] If $X = \{ 3 , 4 \}$, $Y = \{ 4 , 5 \}$, $Z = \{ 6 , 5 \}$, find:

- ①
- $X \times (Y \cap Z)$
- ②
- $(X-Y) \times (Y-Z)$

[Q2] A) Choose the correct answer:(1) If $X = [- 2 , 2 [$, $Y = [0 , 4]$, then $(- 2 , - 1) \in$

- a)
- X^2
- b)
- Y^2
- c)
- $X \times Y$
- d)
- $Y \times X$

(2) If $\frac{3}{4} A = \frac{3}{2} B = 3 C$, then $A : B : C =$

- a) 3 : 4 : 2 b) 1 : 2 : 4 c) 4 : 2 : 1 d) 4 : 3 : 2

(3) If $Y \propto \frac{1}{X}$, $2 X + \frac{3}{y} = \text{Zero}$, then the variation constant is

- a)
- $\frac{3}{2}$
- b)
- $-\frac{3}{2}$
- c)
- $\frac{2}{3}$
- d)
- $-\frac{2}{3}$

[B] If b is middle proportion between a , c, Prove that:

$$\frac{2 c^2 - 3 b^2}{2 b^2 - 3 a^2} = \frac{c}{a} = \frac{c^2}{b^2}$$

[3]

Q] If $X = \{1, 4, 7\}$, $Y = \{-11, 4, 7\}$, and R is relation from X to Y where $a R b$ means " $a + |b| = 8$ ", for $a \in X, b \in Y$

① Write R and represents it with arrow diagram

② Is R function or not? Give reason

3] Calculate the standard deviation for the values
5, 6, 7, 8, 9

Q4] [A] If the value of speed V that water passes through a hose nozzle inversely change with square of the hose nozzle radius length r and $V = 5 \text{ m/s}$ when $r = 3$, find V when $r = 2.5 \text{ cm}$



[B] If $F(x) = aX + b$, $F(a) = b$, find value of $\sqrt{ab^2 + 25}$

[Q5] [A] If $\frac{a+2b}{5} = \frac{3b-c}{3} = \frac{c-a}{2}$, prove that: $a : b : c = 1 : 2 : 3$

[B] In the opposite figure:

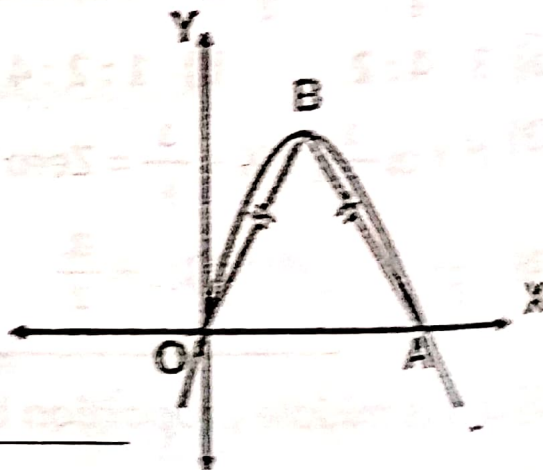
The curve represents

$$F(x) = -\frac{4}{9}x^2 + \frac{3}{3}x, AB = OB$$

Find:

① Coordinate of A, B

② Perimeter and area of $\triangle AOB$



End of the questions

ALGEBRA – MODEL No

1

Q1) A) Choose the correct answer:

(1) The third proportion between 3 , 6 is

- a) $\frac{1}{2}$ b) 2 c) 9 d) 12

(2) If $Y = 4 X$, then.....

- a) $Y \propto \frac{1}{x}$ b) $X \propto \frac{1}{y}$ c) $Y \propto X$ d) Other wise

(3) $\mathcal{F}(x) = X (3 X + 2)^2$ is a function of Degree

- a) First b) Second c) Third d) fourth

B): If $X = \{ 1 , 3 , 5 \}$, $Y = \{ 4 , 5 \}$, Find $(X \cap Y) \times (X \cup Y)$ Q2) A) Choose the correct answer:(1) If $X = \{ 7 \}$, $Y = \{ 5 \}$, then $n (X \times Y) =$

- a) Zero b) 1 c) 2 d) 35

(2) The difference between the greatest value and the smallest value of a set of data is

- a) The mean b) The range c) The median d) The mode

(3) The arithmetic mean for the values 7 , 3 , 6 , 9 , 5 equal

- a) 3 b) 4 c) 6 d) 12

B): If B is a middle proportion between A , C , prove that:

$$\frac{A^2 + B^2}{B^2 + C^2} = \frac{A}{C}$$

Q3

A) If $X = \{ 1, 2, 4 \}$, $Y = \{ 4, 5, 2, 7 \}$ and \mathcal{R} is a relation from X to Y where $a \mathcal{R} b$ means " $a + b = 6$ " for $a \in X$, $b \in Y$:

- ① Write \mathcal{R} and represents it by arrow diagram
 - ② Prove that R is a function and write its range
-

B) If $\frac{X}{2} = \frac{Y}{3} = \frac{Y-X}{5k}$, find the value of k ?

Q4

A) If $Y \propto \frac{1}{X}$ and $Y = 8$ when $X = 3$. Find the relation between Y and X then find value of Y when $X = 4$.

B) Find the standard deviation for the values 12, 13, 16, 18, 21

Q5

A) If the straight line which represents $\mathcal{F}: \mathcal{R} \rightarrow \mathcal{R}$, $\mathcal{F}(x) = 6x + K$ cut Y -axis at point $(m, 3)$, find the value of m, K .

B) Graph the function $\mathcal{F}(x) = (x - 2)^2$ where $x \in [-1, 5]$ and from graph find:

- ① The coordinates of vertex
- ② The maximum value of function
- ③ The equation of the axis of symmetry

◆ ◆ ◆

End of the questions

ALGEBRA – MODEL No 2**Q1) A) Choose the correct answer:**

(1) Which of the following from the dispersion measurement?

- a) Median b) Mean c) Range d) Mode

(2) If $X \propto Y$, $X = \dots\dots\dots$, where $m \neq 0$

- a) $m + Y$ b) $\frac{m}{y}$ c) $\frac{1}{m y}$ d) $m \times y$

(3) For any two sets A , B, the set $\{ (x,y) : x \in A , y \in B \}$ represents

- a) $n (A \times B)$ b) $A \times B$ c) $n (B \times A)$ d) $B \times A$

B): Find the arithmetic mean and the standard deviation for the set of values: 7 , 12 , 6 , 15 , 10

Q2) A) Choose the correct answer:

(1) Which value of a make the range of the set of the following values **53 , a , 85 , 57 , 60 , 55** equal **9** :

- a) 63 b) 61 c) 51 d) 50

(2) If $3 , x , \frac{1}{y}$, are proportional quantities, then $\dots\dots\dots = 3$

- a) $X^2 Y$ b) Y c) $X Y$ d) $\frac{x^2}{y}$

(3) If $\mathcal{F}(x) = n X^2 + 2 X^n - 3$, then the possible value of n which make $\mathcal{F}(x)$ if function of second degree is $\dots\dots\dots$

- a) $\{ 2 , 3 \}$ b) $\{ 1 , -1 \}$ c) $\{ 2 , 1 , 0 \}$ d) $\{ 2 , 1$

B): If $Y \propto \frac{1}{x}$, and $Y = 6$ when $X = 2$, find the value of X when $Y = \frac{3}{4}$

Q3

A) If $\frac{x}{5} = \frac{y}{3} = \frac{z}{6}$, prove that: $\frac{2x + y - z}{7} = \frac{y+z}{9}$

B) If $X = \{1, 4, 7\}$, $Y = \{-1, 1, 4, 7\}$ and \mathcal{R} is a relation from X to Y where $a \mathcal{R} b$ means " $a + |b| = 6$ " for $a \in X, b \in Y$:

- ① Write \mathcal{R} and represents it by arrow diagram
 - ② Is \mathcal{R} function or not? Give reason.
-

Q4

A) If a, b, c, d are in continued proportion,

Prove That: $\frac{c^2 + a}{b} = \frac{d^2 + c}{d}$

B) Graph the function $\mathcal{F}: \mathcal{R} \rightarrow \mathcal{R}, \mathcal{F}(x) = 2x - 4$

- ① From the graph find the intersection points with X-axis and Y-axis
 - ② If: $\mathcal{F}(a) = 20$, find the value of a
-

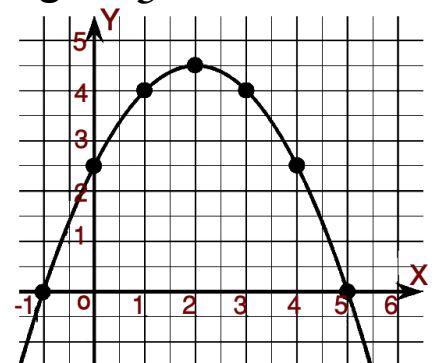
Q5

- The curve represents a function of second degree \mathcal{F} :

- ① Write the domain of \mathcal{F}

Use the graph to find:

- ② The range of the function \mathcal{F}
- ③ The equation of the line of symmetry
- ④ The maximum value of \mathcal{F}
- ⑤ The value of $\mathcal{F}(1)$
- ⑥ If $\mathcal{F}(x) = a(x - 2)^2 + K$, then find the numerical value of $a + k$



◆ ◆ ◆
End of the questions

ALGEBRA – MODEL No 3**3****Q1) A) Choose the correct answer:**

(1) The difference between the greatest and smallest value is

- a) Median b) Mean c) Range d) Mode

(2) If $\mathcal{F}: \mathcal{R} \rightarrow \mathcal{R}$, $\mathcal{F}(x) = 3$, then $\frac{\mathcal{F}(6)}{\mathcal{F}(0)} = \dots\dots\dots$

- a) 6 b) 1 c) 3 d) Undefined

(3) Which of the following represents inverse variation?

- a) $Y = X$ b) $Y = X^2$ c) $XY^2 = 1$ d) $Y = \frac{3}{y}$

B): If $X = \{2, 3\}$, $Y = \{3, 4\}$, $Z = \{4, 5\}$, find:

① $Z \times (X \cap Y)$

② $(Z - Y) \times X$

Q2) A) Choose the correct answer:(1) If the point $(X + 1, X - 3)$ lies on X-axis, then $X =$

- a) -1 b) Zero c) -2 d) 3

(2) If $A(a, 4)$ satisfies the function $\mathcal{F}: \mathcal{R} \rightarrow \mathcal{R}$, $\mathcal{F}(x) = 2X + b$, then $6a + 3b = \dots\dots\dots$

- a) 12 b) 9 c) 6 d) 3

(3) If $X \times Y = \{(1,2), (1,3), (1,4)\}$, then $n(X) + 2(Y^2) = \dots\dots\dots$

- a) 3 b) 4 c) 6 d) 10

B): If $X, 2, 4, 2Y$ are in continued proportion.
Find the value of $X + Y$

Q3

A) If $X = \{-2, -1, 0, 1\}$, $Y = \{-1, 0, 1, 2, 4\}$ and \mathcal{R} is a relation from X to Y where $a \mathcal{R} b$ means " $b = a^2$ " for $a \in X$, $b \in Y$:

- ① Write \mathcal{R} and represents it by arrow diagram
- ② Is \mathcal{R} function or not? Give reason.

B) The following values for five students in exam: **8, 9, 6, 12, 10**
Find: ① The arithmetic mean ② The standard deviation

Q4

A) Graph the function $\mathcal{F}(x) = x(x - 2) - 3$ where $x \in [-2, 4]$ and from graph find:

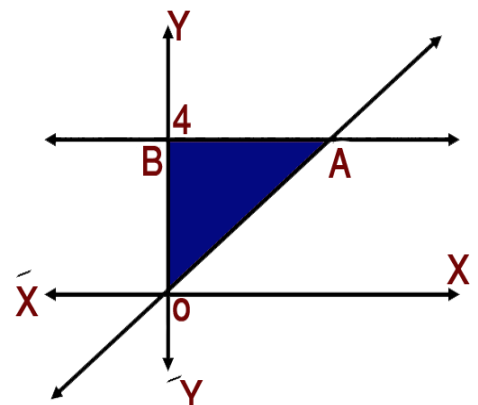
- ① The coordinates of vertex
- ② The maximum or minimum value of function
- ③ The equation of the axis of symmetry

B) If $\frac{a+b}{5} = \frac{b+c}{3} = \frac{c+a}{6}$, prove that: $\frac{a+b+c}{a-c} = \frac{7}{2}$

Q5

A) If $Y = 2 + b$, where $b \propto X$ and $X = 1$ when $Y = 5$, find the relation between X , Y then find the value of Y when $X = 2$

B) The opposite figure shows the \overrightarrow{AB} which represents the function $\mathcal{F}(x) = 4$, if \overrightarrow{OA} represents the linear function $G(x) = nx + k$ and the area of the triangle ABO equals 4 square units, then find the value of n , k where O is the origin point.



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End of the questions

ALGEBRA – MODEL No**4****Q1) A) Choose the correct answer:**

(1) If $X = \{ 1, 3, 5 \}$, R is function on X , $R = \{ (a,3), (b,1), (1,5) \}$
then $a + b = \dots\dots\dots$

- a) 4 b) 6 c) 8 d) 2

(2) If $(L - 3, 2)$ lies in first quadrant, then L may be equals $\dots\dots\dots$

- a) -3 b) 2 c) 7 d) Zero

(3) If $2a = 3b$, then $\frac{3a}{2b} = \dots\dots\dots$

- a) $\frac{3}{2}$ b) $\frac{2}{3}$ c) $\frac{9}{4}$ d) $\frac{4}{9}$

B): If $X^2 Y^2 - 4XY = -4$, prove that X is varies inverse with Y .

Q2) A) Choose the correct answer:

(1) The simplest dispersion measurement is $\dots\dots\dots$

- a) Mean b) Median c) Standard deviation d) range

(2) If $(a, 2) \in$ Straight line $Y = 3X - 4$, then $a = \dots\dots\dots$

- a) 2 b) 3 c) 4 d) 7

(3) If $n(x) = 2$, $n(X \times Y) = 8$, then $n(Y^2) = \dots\dots\dots$

- a) 4 b) 2 c) 16 d) 8

B): Find the number which if it added to the two terms of the ratio **7:11** it will be **2 : 3**.

Q3

A) Find the standard deviation for the values: 2 , 5 , 6 , 8 , 9

B) The straight line which represents $\mathcal{F} : \mathcal{R} \rightarrow \mathcal{R}$ where $\mathcal{F}(x) = 3x + a$ cut Y-axis at the point (b , 7). **Find** the value of $2a - 5b$

Q4

A) If $\frac{a}{4} = \frac{b}{5} = \frac{c}{3}$, **prove that:** $\frac{a-b+c}{a+b-c} = \frac{1}{3}$

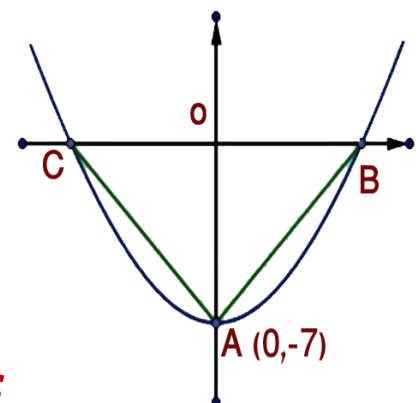
B) If $X = \{ 1 , 2 \}$, $Y = \{ 0 , 2 , 3 \}$ and \mathcal{R} is a relation form X to Y where **a \mathcal{R} b** means "**a + b is odd number**" for $a \in X$, $b \in Y$:

- ① Write \mathcal{R} and represents it by arrow diagram
 - ② Is \mathcal{R} function or not? Give reason.
-

Q5

A) If $(3 - x , Y + 2) = (- 4 , 4)$, **Find** the value of $\sqrt{x + y}$

B) The opposite figure represents the curve of the function $\mathcal{F} : \mathcal{F}(x) = Lx^2 - 7$, the area of the $\triangle ABC = 21$ square units, **A (0 , -7)**. **Find** the coordinate of the point B, and then **find** the value of L.



◆ ◆ ◆
End of the questions

ALGEBRA – MODEL No**5****Q1) A) Choose the correct answer:**

(1) If $5X = 9Y$, then $\frac{3x}{2y} = \dots\dots\dots$

- a) $27 : 10$ b) $9 : 5$ c) $5 : 9$ d) $81 : 25$

(2) The opposite figure represents a curve of quadratic function, if point A $(-4, 0)$, then the equation of line of symmetry is $X = \dots\dots$

- a) 1 b) -1 c) -2 d) Zero

(3) The number that it is added to each of the numbers **1, 3, 6** it becomes proportional is $\dots\dots\dots$

- a) 4 b) 3 c) 2 d) 1

B): If B is mean proportional between A, C.

Prove that: $\frac{a^2}{b^2} + \frac{b^2}{c^2} = \frac{2a}{c}$

Q2) A) Choose the correct answer:

(1) If $\mathcal{F}(X + 3) = X - 3$, then $\mathcal{F}(7) = \dots\dots\dots$

- a) 4 b) 1 c) 7 d) 10

(2) If $\sum (X - \bar{X})^2 = 36$ for nine of the values, then the standard deviation equals $\dots\dots\dots$

- a) 2 b) 18 c) 27 d) 4

(3) If $\mathcal{F}(x) = 3$, then $\mathcal{F}(2) - \mathcal{F}(7) = \dots\dots\dots$

- a) 5 b) -5 c) Zero d) -4

B): If $X = \{4, 5, 7\}$ and \mathcal{R} is function on X and $\mathcal{R} = \{(a, 5), (b, 5), (4, 7)\}$

① Find the numerical value of **$3a + 2b$**

② The range of the function

Q3

A) If $\frac{a}{4x+y} = \frac{b}{x-4y}$, prove that: $\frac{a+b}{5x-3y} = \frac{a-b}{3x+5y}$

B) Find the standard deviation for the values: 12 , 13 ,16 , 18 , 21

Q4

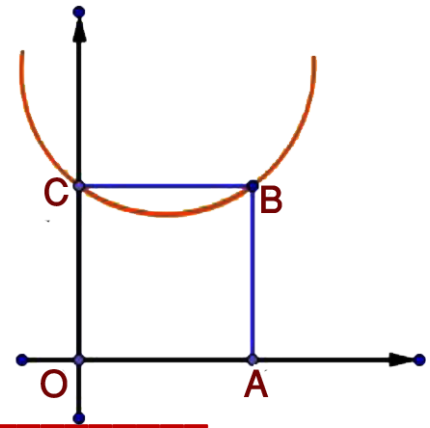
A) The opposite figure:

Represents the quadratic function

$$f: f(x) = x^2 - (K-2)x - K + 4$$

If ABCO is a square

Find the value of K



B) If $Y = 1 + b$ where b varies inverse with square of X , and $X = 1$ where $Y = 5$. **Find** the relation between X , Y then **find** the value of Y when $X = 2$

Q5

A) If $f(x) = a + x^2$, $g(x) = c$ are two polynomial function where a, c are two constant and $3f(2) + 3g(x) = 6$, **find** the numerical value of $2f(0) + 2g(7)$

B) If $X = \{3, 5, 7\}$, $Y = \{X : X \in \mathbb{N}, 10 < X < 30\}$ and the function f from $X \rightarrow Y$ where $f = \{(3,9), (5,15), (7,21)\}$
Find: ① The domain of f ② Write the rule of f

◆ ◆ ◆
End of the questions

ALGEBRA – MODEL No

6

Q1 A) Choose the correct answer:

(1) If the point $(X-3, 2-X)$ lies in fourth quadrant, then $X = \dots\dots$

- a) 4 b) 3 c) 2 d) 1

(2) If $\mathcal{F}(x) = KX + 8$, $\mathcal{F}(2) = \text{zero}$, then $K = \dots\dots\dots$

- a) 8 b) 6 c) 4 d) -4

(3) If $a, 2, 4, b$ are in continued proportion, then $a + b = \dots\dots\dots$

- a) 2 b) 4 c) 6 d) 9

B): If b is mean proportion between a, c

Prove that: $\frac{2c^2 - 3b^2}{2b^2 - 3a^2} = \frac{c}{a}$

Q2 A) Choose the correct answer:

(1) If $Y \propto X$, $Y \propto \frac{1}{Z}$, then $Y \propto \dots\dots\dots$

- a) XZ b) $\frac{Z}{X}$ c) $\frac{X}{Z}$ d) X^2Z

(2) The standard deviation of the values $5, 5, 5, 5$ is

- a) Zero b) 5 c) 6 d) 2

(3) The function $F(x) = X^2 - (X-3)^2$ of degree

- a) Zero b) First c) Second d) Third

B): The point $(-1, 2)$ is the vertex of the curve $\mathcal{F}(x) = aX^2 - 6x + c$.
find the value of C

Q3

A) If $3a = 4b = 6c$, find $a : b : c$ then find the numerical value of the expression $\frac{3a+2b}{a+4c}$

B) If $X = \{-2, -1, 0, 1, 2\}$, and \mathcal{R} is a relation on X where $a \mathcal{R} b$ means "**a is additive invers of b**" for $a, b \in X$:

① Write \mathcal{R} and represents it by arrow diagram

② Is \mathcal{R} function or not? Give reason.

Q4

A) If $X = Z + 8$, Z varies inverse with Y and $Z = 2$ when $Y = 3$. **Find** the relation between X, Y then **find** the value of Y when $X = 3$

B) If $\mathcal{F}(x) = 2x + 5$, $\mathcal{G}(x) = x - 6$. **Prove that** $\mathcal{F}(2) + 3\mathcal{G}(3) = 0$

Q5

A) Find the arithmetic mean and standard deviation for the values **5, 7, 8, 9, 6**

B) If $(X - 2, 2^{y-1}) = (3, 1)$, find the value of X, Y

◆ ◆ ◆
End of the questions

ALGEBRA – MODEL No 7**7****Q1) A) Choose the correct answer:**

(1) The range of the values 7 , 3 , 6 , 9 , 5 equals

- a) 3 b) 4 c) 6 d) 12

(2) $a : b = a^2 : \dots$, $a \neq b \neq \text{zero}$

- a)
- b^2
- b)
- $a b$
- c)
- $a^2 b$
- d)
- $a b^2$

(3) If $X = [0,5]$, $Y = [-3,2[$, then $(-2,4) \in \dots$

- a)
- X^2
- b)
- Y^2
- c)
- $X \times Y$
- d)
- $Y \times X$

B): If b is mean proportion between a , cProve that: $\frac{a^2 + b^2}{b^2 + c^2} = \frac{a}{c}$ **Q2) A) Choose the correct answer:**

(1) The relation represents inverse variation between Y , X is

- a)
- $Y = 5 X$
- b)
- $\frac{x}{5} = \frac{4}{y}$
- c)
- $\frac{x}{5} = \frac{y}{3}$
- d)
- $Y = X + 3$

(2) If $X = \{1,2,3\}$, $R = \{ (a , b) : a \in X , b \in Y \}$ then number of elements in R equals

- a) 12 b) 9 c) 6 d) 3

(3) If the curve of the function $\mathcal{F} : \mathcal{F}(x) = x^2 + b x - 3$ cut from negative part of X-axis only one units, then **b** =

- a) b) c) d)

B): If $(\sqrt{x-1}, 11) = (4, Y+3)$, find the value of $\sqrt{x+y}$

Q3

A) If $\mathcal{F}: \mathcal{F}(x) = X^2 + bX + c$, and $F(2) = 2$ when $X \in \{0, 3\}$. **Find** the value of b, c .

B) Find the standard deviation for the values **5, 7, 8, 14, 16**

Q4

A) If $X = \{-1, 0, 1\}$, and \mathcal{R} is a relation on X where **a \mathcal{R} b** means " **$b = a^2$** " for $a, b \in X$:

- ① Write \mathcal{R} and represents it by arrow diagram
 - ② Is \mathcal{R} function or not? If R is a function, find its range.
-

B) If $\frac{x}{3} = \frac{y}{4} = \frac{z}{5}$, **prove that:** $\frac{2y-z}{3x-2y+z} = \frac{1}{2}$

Q5

A) If $\mathcal{F}: \mathcal{F}(x) = aX^2 + 5X + 7$, if linear function, **find** the value of a then find $\mathcal{F}(-1)$.

B) If the weight of a body on the moon (**W**) is directly proportional with its weight on the ground (**R**), if the body weight **84 kg**, on the ground and its weight on the moon is **14 kg**. What will its weight be on the moon if its weight on the ground **144 kg**?

◆ ◆ ◆
End of the questions

ALGEBRA – MODEL No**8****Q1) A) Choose the correct answer:**(1) If $X = \{12\}$, then $n(X^2) = \dots\dots\dots$

- a) 1 b) 2 c) 4 d) 144

(2) If $(a, a) \in \mathcal{F}$, $\mathcal{F}(x) = 2x - 3$, then $a = \dots\dots\dots$

- a) Zero b) 1 c) 2 d) 3

(3) If the range of the values 7, 3, 6, K, 5 is 6, then $K = \dots\dots\dots$

- a) 3 b) 6 c) 9 d) 12

B): If $X = \{3, 4\}$, $Y = \{4, 5\}$, $Z = \{6, 5\}$, find :

① $X \times (Y \cap Z)$

② $(X - Y) \times Z$

Q2) A) Choose the correct answer:(1) If $X = [-2, 2[$, $Y = [0, 4]$, then $(-2, -1) \in \dots\dots\dots$

- a) X^2 b) Y^2 c) $X \times Y$ d) $Y \times X$

(2) If the quantities 5a, 2, 3b, 7 are proportional, then $\frac{a}{b} = \dots\dots\dots$

- a) $\frac{3}{7}$ b) $\frac{6}{35}$ c) $\frac{3}{5}$ d) $\frac{3}{2}$

(3) If $Y - X = \frac{1}{x} - \frac{1}{y}$, where $X \neq Y$ zero, then $\dots\dots\dots$

- a) $Y \propto \frac{1}{x}$ b) $Y \propto \frac{1}{x^2}$ c) $Y \propto X$ d) $Y \propto X + 1$

B): If a, b, c, d are in continued proportion, prove that:

$$\Rightarrow \frac{a^2 - 3c^2}{b^2 - 3d^2} = \frac{b}{d}$$

Q3

A) If $X = \{-1, 1, 2, \frac{1}{2}\}$ and R is relation on X where $a \mathcal{R} b$ means " $b = a^{-1}$ " for $a, b \in X$:

- ① Write \mathcal{R} and represents it by arrow diagram
 - ② Is \mathcal{R} function or not? If R is a function, find its range.
-

B) Find the standard deviation for the values 5, 7, 8, 9, 6

Q4

A) If the value of speed (V) that water passes through a hose nuzzle inversely changes with the square of the hose radius length (r), and $V = 5$ cm/s when $r = 3$ cm. find V when $r = 2.5$ cm

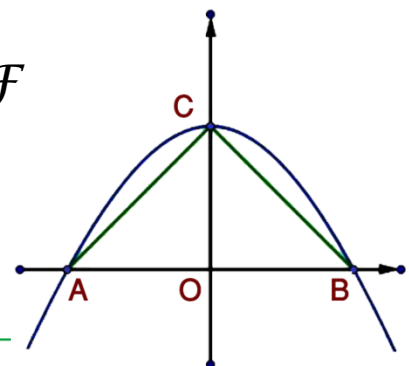
B) If $\mathcal{F}(x) = aX + b$, and $\mathcal{F}(a) = b$, find the numerical value of $ab^2 + 5$

Q5

A) If $\frac{a+b}{7} = \frac{b+c}{5} = \frac{c+a}{6}$, find $a : b : c$

B) The opposite figure represents function \mathcal{F}
Where $\mathcal{F}(x) = 5 - x^2$, **find**:

- ① The coordinates of points B, C
- ② Area of $\triangle ABC$



◆ ◆ ◆
End of the questions

ALGEBRA – MODEL No**9****Q1) A) Choose the correct answer:**(1) If $\{2\} \times \{x, y\} = \{(2, 4), (2, 3)\}$, then $X - Y = \dots\dots\dots$

- a) 1 b) -1 c) ± 1 d) Zero

(2) If $\mathcal{F}(x) = KX + 8$, $\mathcal{F}(2) = \text{zero}$, then $K = \dots\dots\dots$

- a) 8 b) 1 c) 3 d) -1

(3) If the standard deviation for some of values equals 2, and the number of these values is 2, then $\sum (x - \bar{x})^2 = \dots\dots\dots$

- a) 12 b) 18 c) 24 d) 36

B): If $\frac{a}{b-a} = \frac{c}{d-c}$,Prove that a, b, c, d are proportional quantities**Q2) A) Choose the correct answer:**(1) If $\frac{a}{3} = \frac{b}{2} = \frac{2a+b}{x}$, then $x = \dots\dots\dots$

- a) 8 b) 4 c) 3 d) 1

(2) If $3, X, \frac{1}{y}$ are in continued proportional, then $Y \propto \dots\dots\dots$

- a) X b) $\frac{1}{x}$ c) X^2 d) $\frac{1}{x^2}$

(3) The simplest dispersion measurement is $\dots\dots\dots$

- a) Range b) Median c) Mean d) Mode

B): Find the standard deviation for the values 6, 8, 10, 12, 14

Q3

A) If $X = \{ 1, 2, 3 \}$, $Y = \{ 1, 4, 9, 10 \}$ and \mathcal{R} is a relation from X to Y where $a \mathcal{R} b$ means " $a = \sqrt{b}$ " for $a \in X$, $b \in Y$:

- ① Write \mathcal{R} and represents it by arrow diagram
- ② Prove that \mathcal{R} is a function and write its range

B) If the curve of function $\mathcal{F}: \mathcal{R} \rightarrow \mathcal{R}$ where $\mathcal{F}(x) = m - x^2$ cut x-axis in the point $(-2, b)$, find the value of $F(x) = m^b + 2m$

Q4

A) Graph the function $\mathcal{F}(x) = (x - 2)^2$ where $x \in [0, 4]$ and from graph find:

- ① The equation of the axis of symmetry
- ② The maximum value of function

B) IF $Y = 5 + a$, $a \propto X$, find the relation between X , y where $a = 6$ when $X = 2$, then find X when $Y = 8$

Q5

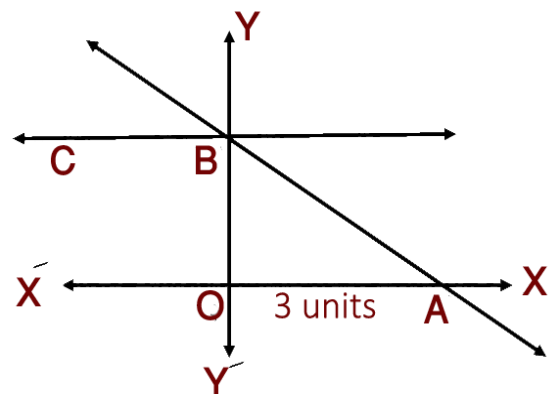
A) If A, b, C, D are in continued proportion, prove that:

$$\left(\frac{a+b}{b+c} \right)^3 = \frac{a}{d}$$

B) In the opposite figure:

The function \mathcal{F} represents by \overrightarrow{AB} ,
 $OA = 3$ units, the function $G: G(x) = 6$
 Represents by \overrightarrow{BC} .

- ① Find the rule of \mathcal{F}
- ② The value of $\mathcal{F}(6) + G(1)$



◆ ◆ ◆
End of the questions

ALGEBRA – MODEL No**10****Q1) A) Choose the correct answer:**

(1) The range for the values 5 , 14 , 4 , 37 , 15 , 16 , 7 is

- a) 33 b) 32 c) 30 d) 22

(2) If $X = \{ 3 , 1 , 5 \}$ and \mathcal{R} is function on X where $\mathcal{R} = \{ (a,3) , (b,1) , (1,5) \}$, then the numerical value of $a + b = \dots$

- a) 4 b) 6 c) 8 d) 10

(3) If $b < 3$, then the point $(- 5 , b - 3)$ lies in quadrant

- a) First b) Second c) Third d) Fourth

B): If a , b , c , d are in continued proportion, prove that:

$$\Rightarrow \frac{a-d}{a+b+c} = \frac{a-2b+c}{a-b}$$

Q2) A) Choose the correct answer:(1) If $a , x , b , 2x$ are proportional, then $\frac{b}{a} = \dots\dots\dots$

- a) $\frac{3}{2}$ b) $\frac{2}{3}$ c) 3 d) 2

(2) The relation which represents direct variation between X , Y is ...

- a) $XY = 5$ b) $\frac{x}{5} = \frac{y}{3}$ c) $Y = X + 3$ d) $\frac{x}{5} = \frac{4}{y}$

(3) If $\mathcal{F}(X - 4) = X + 3$, then $\mathcal{F}(3) = \dots\dots\dots$

- a) 5 b) 6 c) 10 d) 20

B): Find the arithmetic mean and the standard deviation for the values 7 , 12 , 6 , 15 , 10

Q3

A) If $X = \{-2, -1, 0, 1, 2\}$, $Y = \{4, 2, \frac{3}{2}, 1, \frac{1}{2}, \frac{1}{4}, \frac{1}{8}\}$ and \mathcal{R} is a relation from X to Y where $a \mathcal{R} b$ means " $b = 2^a$ " for $a \in X, b \in Y$:

- ① Write \mathcal{R} and represents it by arrow diagram
- ② Prove that R is a function and write its range

B) If $\frac{x+y}{7} = \frac{y+z}{5} = \frac{x+z}{8}$, prove that: $\frac{x+y+z}{x-z} = 5$

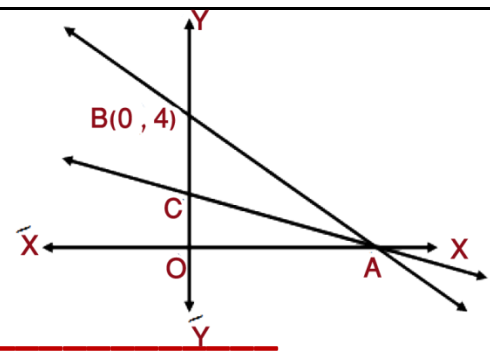
Q4

A) In the opposite figure:

\overrightarrow{AC} represents $\mathcal{F}(x) = 2 - \frac{2}{3}x$,

\overrightarrow{AB} represents $G(x) = Kx + m$

If $B(0, 4)$, find the value of k, m



B) If $2a = 3b = 4c$, find the value of $\frac{a^2 + b^2 + c^2}{a(b+c)}$

Q5

A) If $Y = Z + 5$, and Z varies inverse with X , $Y = 6$ when $X = 2$.

Find the relation between X, Y then Find value of Y at $X = 1$

B) In the opposite figure:

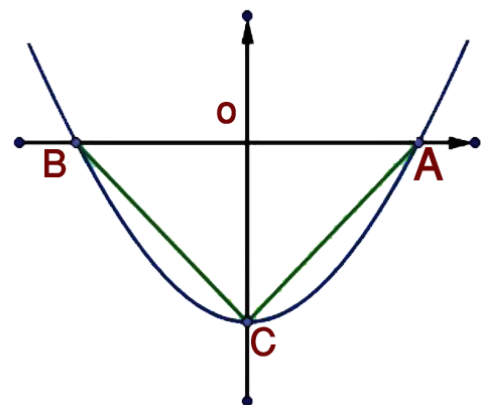
$\mathcal{F}: \mathcal{F}(x) = x^2 - K$, the triangle ABC

An equilateral triangle its area

Equals $9\sqrt{3}$ square units

Find: ① The value of K

② The coordinate of A, B



◆ ◆ ◆
End of the questions

ALGEBRA – MODEL No**11****Q1) A) Choose the correct answer:**

(1) If $\frac{a}{b} = \frac{b}{c} = \frac{c}{d} = 2$, then $\frac{a}{d} = \dots\dots$

- a)
- 5×2^2
- b) 40 c) 10 d)
- 2×5^3

(2) If $\{2\} \times \{x, y\} = \{(2, 4), (2, 3)\}$, then $X - Y = \dots\dots\dots$

- a) 1 b) -1 c)
- ± 1
- d) Zero

(3) If $(|x|, 4) = (3, Y^2)$, and the point (x, y) lies in the fourth quadrant, then $X + Y = \dots\dots\dots$

- a) 7 b) 1 c) -1 d) -7

B): Find the arithmetic mean and the standard deviation for the values 14, 15, 20, 22, 24**Q2) A) Choose the correct answer:**

(1) If $3a = 2b = 4c$, then $a : b : c = \dots\dots\dots$

- a) 3 : 4 : 6 b) 3 : 6 : 4 c) 4 : 6 : 3 d) 4 : 3 : 6

(2) The relation which represents direct variation between X, Y is ...

- a)
- $XY = 5$
- b)
- $\frac{x}{5} = \frac{y}{3}$
- c)
- $Y = X + 3$
- d)
- $\frac{x}{5} = \frac{4}{y}$

(3) Selecting a sample of layers of statistical society is called sample

- a) Random b) Class (layer) c) Deliberate d) bunch

B): If $X - Y = \{7\}$, $Y - X = \{4, 2\}$, $X \cap Y = \{6\}$, find:

① $(X - Y) \times Y$

② $(Y - X) \times X$

Q3

A) If $\frac{x+y}{25} = \frac{x-y}{11} = \frac{x+y-z}{8}$, prove that: $X : Y : Z = 18 : 7 : 17$

B) If the set of function $\mathcal{F} = \{ (0, 5), (2, 3), (3, 2), (4, 1), (1, 4) \}$

① Find the domain and range of \mathcal{F}

② Write the rule of \mathcal{F}

Q4

A) If B is mean proportional between A , C.

Prove that: $\frac{2c^2 - 3b^2}{2b^2 - 3a^2} = \frac{c^2}{b^2} = \frac{c}{a}$

B) If $\mathcal{F} : \mathcal{R} \rightarrow \mathcal{R}$ where $\mathcal{F}(x) = (a - 3)X^2 + bX + 5$ of first degree, $\mathcal{F}(3) = 11$, find the value of a , b

Q5

A) IF $Y = a - 9$, $Y \propto \frac{1}{x^2}$, and $a = 18$ at $X = \frac{3}{2}$, find the relation between X , y then find Y when $X = 1$

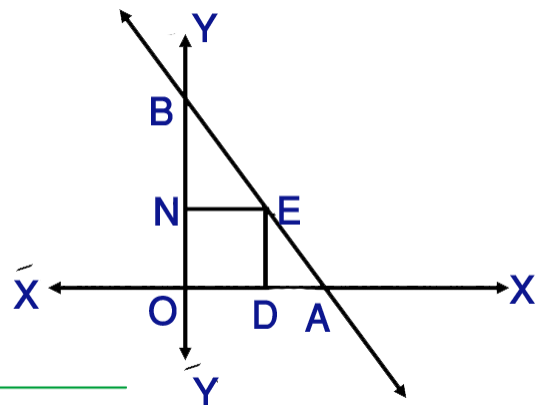
B) In the opposite figure:

\overrightarrow{AB} represent $\mathcal{F}(x) = KX + m$,

$A(3, 0)$, $B(0, 6)$, ODNE is square

Find: ① The rule of Function \mathcal{F}

② The area of Square ODEN



◆ ◆ ◆
End of the questions

ALGEBRA – MODEL No**12****Q1) A) Choose the correct answer:**

(1) If the range of the values 2 , 7 , a , 6 is 8, $a > 0$, then $a = \dots\dots\dots$

- a) 4 b) 9 c) - 1 d) 10

(2) If $Y = 3X - 6$, then $Y \propto \dots\dots\dots$

- a) X b) 3X c) X - 2 d) X - 6

(3) If the point $(K^2 - 4, K)$ lies on the negative part from Y-axis, then the value of $K = \dots\dots\dots$

- a) ± 2 b) 4 c) - 2 d) 2

B): Find the arithmetic mean and the standard deviation for the values 8 , 9 , 7 , 6 , 5

Q2) A) Choose the correct answer:

(1) The maximum value of $F(x) = -2x^2 + 4x + 3$ is $\dots\dots\dots$

- a) 5 b) 1 c) 3 d) - 1

(2) If a , 3 , 9 , b are in continued proportion, then $a + b = \dots\dots\dots$

- a) 12 b) 26 c) 27 d) 28

(3) If $X = \{3, 1, 5\}$ and \mathcal{R} is function on X where

$\mathcal{R} = \{(a,3), (b,1), (1,5)\}$, then the numerical value of $a + b = \dots\dots$

- a) 4 b) 6 c) 8 d) 10

B): If $\frac{x+y}{5} = \frac{y+z}{3} = \frac{x+z}{6}$, prove that: $\frac{x-z}{x+y+z} = \frac{2}{7}$

Q3

A) If $X = \{ 1, 2, 4, 6, 10 \}$ and \mathcal{R} is relation on X where $a \mathcal{R} b$ means "**a is multiple of b**" for $a, b \in X$:

- ① Write \mathcal{R} and represents it by arrow diagram
 - ② Is \mathcal{R} function or not? Give reason
-

B) If B is mean proportional between A, C .

Prove that: $\frac{a+b+c}{a^{-1}+b^{-1}+c^{-1}} = b^2$

Q4

A) If $\mathcal{F}(x) = 5x - b$, $\mathcal{G}(x) = x - 2b$, and $\mathcal{F}(1) + \mathcal{G}(3) = -7$,
Find $\mathcal{F}(3) + \mathcal{G}(1)$

B) If $Y = Z + 5$, $Z \propto \frac{1}{x}$, find the relation between X, y where $Y = 6$
when $X = 2$, then find Y when $X = 1$

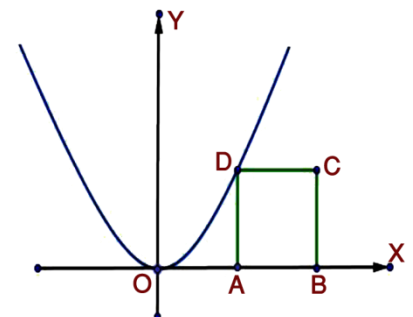
Q5

A) If $4a^2 + 9b^2 = 12ab$, prove that: a varies directly with b

B) In the opposite figure:

If $\mathcal{F}(x) = x^2$ and $ABCD$ is square

$B(6, 0)$, find the area of square $ABCD$



◆ ◆ ◆
End of the questions

ALGEBRA – MODEL No**13****Q1) A) Choose the correct answer:**

(1) If the all the values are equals, then

- a) $X - \bar{X} > 0$ b) $X - \bar{X} < 0$ c) $\sigma = 0$ d) $\bar{X} = 0$

(2) If $\frac{y+3}{y} = \frac{x+2}{x}$, $x \neq y \neq 0$, then

- a) $Y \propto X$ b) $Y \propto \frac{1}{x}$ c) $Y \propto X + 2$ d) $Y \propto X + Y$

(3) If $(|x|, 4) = (3, Y^2)$, and the point (x, y) lies in the fourth quadrant, then $X + Y = \dots\dots\dots$

- a) 7 b) 1 c) -1 d) -7

B): Find the arithmetic mean and the standard deviation for the values 73 , 54 , 62 , 71 , 60

Q2) A) Choose the correct answer:(1) The equation of line of symmetry $\mathcal{F}(x) = (X - 2)^2$ is

- a) $X = 0$ b) $X = 2$ c) $X = -2$ d) $X = -4$

(2) If $\frac{a}{b} = \frac{b}{c} = \frac{c}{d} = 2$, then $\frac{a}{d} = \dots\dots\dots$

- a) 5×2^2 b) 40 c) 10 d) 2×5^3

(3) If $F(x) = X^2$, $X \in [-2, 2]$, then $F(x) \in \dots\dots\dots$

- a) $[0, 4[$ b) $]0, 4[$ c) $[0, 4]$ d) $[-4, 4[$

B): If $\frac{y}{x-z} = \frac{x}{y} = \frac{x+y}{z}$, **prove that** each ratio equal 2 ($x + y \neq 0$)

Then find $X : Y : Z: \frac{2x + y - z}{7} = \frac{y+z}{9}$

Q3

A) If $X = \{1, 2, 3, 6, 11\}$ and \mathcal{R} is relation on X where $a \mathcal{R} b$ means " $a + 2b = \text{odd number}$ " for $a, b \in X$:

- ① Write \mathcal{R} and represents it by arrow diagram
 - ② Is \mathcal{R} function or not? Give reason.
-

B) If the Positive quantities $3K, 2L, M, 6N$ are in continued proportion, prove that: $\frac{L^3 + K^2}{27N + 4} = \left(\frac{2L^2}{3m}\right)^2$

Q4

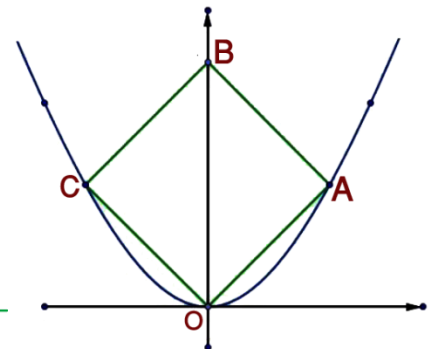
A) IF $\mathcal{F}(x) = 2x + K$, $\mathcal{G}(x) = x^2 + K$, and $\mathcal{F}(2) + \mathcal{G}(-4) = 30$,
Find $\mathcal{F}(-2) + \mathcal{G}(2)$

B) IF $Y = a - 9$, $Y \propto \frac{1}{x^2}$, and $a = 18$ at $X = \frac{3}{2}$, find the relation between X, y then find Y when $X = 1$

Q5

A) If $\frac{21x - y}{7x - z} = \frac{y}{z}$, prove that $Y \propto Z$

B) In the opposite figure:
The curve represents $\mathcal{F}(x) = x^2$
OABC is a square
Find the coordinate of A, B, C



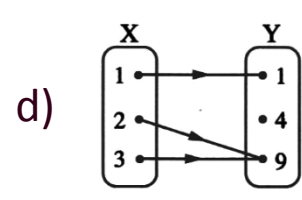
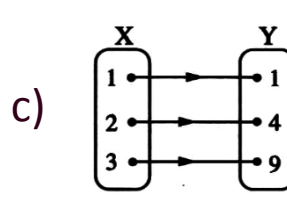
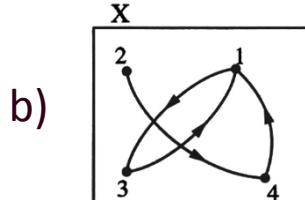
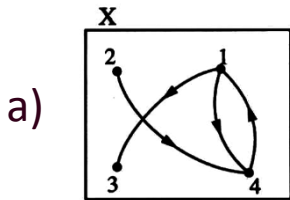
◆ ◆ ◆
End of the questions

ALGEBRA – MODEL No

14

Q1 A) Choose the correct answer:

(1) Which of the following relations not a function?

(2) If $X = \{3\}$, then X^2

- a) $\{9\}$ b) 9 c) $\{(3, 3)\}$ d) $\{(3, 9)\}$

(3) If $\frac{a}{b} = \frac{2}{3}$, $\frac{a}{c} = \frac{4}{5}$, then $b : c =$

- a) 3 : 4 b) 5 : 6 c) 6 : 5 d) 4 : 3

B): Find the arithmetic mean and the standard deviation for the values 8, 9, 7, 6, 5

Q2 A) Choose the correct answer:(1) If $\mathcal{F}(x - 1) = X + 2$, then $\mathcal{F}(4) = \dots\dots\dots$

- a) 5 b) 6 c) 7 d) 8

(2) If $a, X, b, 2X$ are proportional quantities, the $\frac{a}{b} = \dots\dots$

- a) 2 b) $\frac{1}{2}$ c) $\frac{1}{3}$ d) $\frac{1}{4}$

(3) The relation which represents direct variation between X, Y is ...

- a) $XY = 5$ b) $\frac{x}{5} = \frac{y}{3}$ c) $Y = X + 3$ d) $\frac{x}{5} = \frac{4}{y}$

B): If $\frac{x+y}{7} = \frac{y-2z}{5} = \frac{z+x}{4}$, **Find** the numerical value of $\frac{3x+2y}{x+3y-3z}$

Q3

A) If $X = \{-2, 2, 5\}$, $Y = \{3, 7, K\}$ and \mathcal{R} is a relation from X to Y where $a \mathcal{R} b$ means " $b = a^2 - 1$ " for $a \in X$, $b \in Y$:

- ① Find the value of K
- ② Represents \mathcal{F} by arrow diagram

B) If a, b, c, d are in continued proportion, prove that:

$$\Rightarrow \frac{a^2 + d^2}{c(a+c)} = \frac{b}{d} + \frac{d}{b} - 1$$

Q4

A) If the curve of $\mathcal{F}: \mathcal{R} \rightarrow \mathcal{R}$, $\mathcal{F}(x) = m - x^2$ cut X -axis at the point $(-2, b)$. **Find** the value $m^b + 2m$

B) IF $Y = a + 2$, $a \propto \frac{1}{x}$, and $a = 5$ at $X = 2$, find the relation between X, y then **find** Y when $X = 1$

Q5

A) If $2a = 3b = 4c$, **find** the numerical value of $\frac{a^2 + b^2 + c^2}{a(b+c)}$

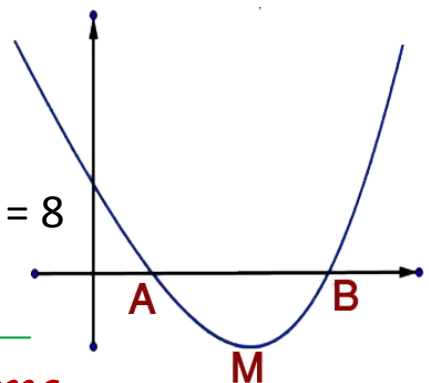
B) **In the opposite figure:**

The curve of quadratic function $F(x)$

Cuts X -axis in $A(1, 0)$, $B(4, 0)$

M is vertex of the curve and $F(-2) + F(7) = 8$

Find the value of $F(-2)$



◆ ◆ ◆
End of the questions

ALGEBRA – MODEL No

15

Q1 A) Choose the correct answer:

(1) If $(X - Y) \times Y = \{(1,2), (1,3)\}$, $n(X \times Y) = 6$, then $X = \dots\dots\dots$

- a) $\{1\}$ b) $\{1, 2\}$ c) $\{1, 3, 6\}$ d) $\{1, 3, 2\}$

(2) If $\mathcal{F}(x) = X - 5$, and $\frac{1}{2} \mathcal{F}(a) = 3$, then $a = \dots\dots\dots$

- a) 2 b) 8 c) 11 d) 16

(3) If $X \in \mathcal{R}^-$, then the point $(-X, \sqrt[3]{x})$ lies in the $\dots\dots\dots$ quadrant.

- a) First b) Second c) Third d) Fourth

B): If $4a^2 + 9b^2 = 12ab$, **prove that:** $a \propto b$

Q2 A) Choose the correct answer:

(1) If $\mathcal{F}(x^2) = x + 2$, then $\mathcal{F}(9) = \dots\dots\dots$

- a) 5 b) 7 c) 11 d) 83

(2) If $\frac{a}{b} = \frac{2}{3}$, $\frac{a}{c} = \frac{4}{5}$, then $b : c = \dots\dots\dots$

- a) 3 : 4 b) 5 : 6 c) 6 : 5 d) 4 : 3

(3) The relation represents inverse variation between Y, X is $\dots\dots\dots$

- a) $Y = 4X$ b) $\frac{x}{y} = \frac{5}{7}$ c) $\frac{x}{5} = \frac{2}{y}$ d) $Y = X + 5$

B): If $\frac{x+y}{3} = \frac{y+z}{8} = \frac{z+x}{6}$,**Prove that:** $\frac{x+y+z}{2x+3y+3z} = \frac{17}{50}$

Q3

A) If $X = \{-3, -2, -1, 0, 1, 2, 3\}$, $Y = [0, 9[$ and \mathcal{R} is a relation from X to Y where $a \mathcal{R} b$ means " $a^2 = b$ " for $a \in X$, $b \in Y$:

- ① Write \mathcal{R} . ② Is \mathcal{R} is a function or not? Give reason.

B) If $\frac{21x+a}{7x+b} = \frac{a}{b}$, $x \neq 0$, find the value of $\frac{a+2b}{2a}$

Q4

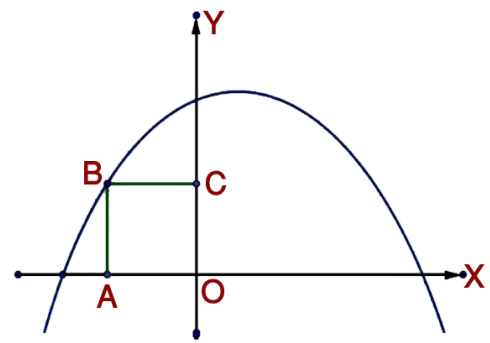
A) In the opposite figure:

The opposite figure represents

Curve of $\mathcal{F}(x) = -x^2 - x + 5$

If OABC is square,

Find its area?



B) IF $Y = K + m$, K is constant, $m \propto X$, and $Y = 3$ at $X = 0$, $Y = 5$ at $X = 3$ find the relation between X , y then **Find** Y when $X = 7$

Q5

A) If $\mathcal{F}(x) = Kx^2 + (3K + 2)x + 6$ and the X -coordinate of the vertex of $\mathcal{F}(x)$ equals 2, **Find** the value of K then find $\mathcal{F}(1) + \mathcal{F}(-1)$

B) The following table represents the excellent pupils in mathematics in 10 preparatory schools in Dakahlia:

No. of pupils	4	6	8	5	Sum
No. of schools	1	2	3	4	10

Find the arithmetic mean and standard deviation for the number of excellent pupils

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End of the questions

MODEL (1)

First: Choose the correct answer from the given :

- 1 The point $(-3, 4)$ lies in quadrant:
 A first B second C third D fourth
- 2 The positive square root of mean of the squares of deviations of values from its arithmetic mean is called.
 A The range B the arithmetic mean
 C The standard deviation D the mode
- 3 If $3a = 4b$, then $a : b = \dots\dots\dots$
 A 3:4 B 4:3 C 3:7 D 4:7
- 4 If $n(x) = 2$, $n(y^2) = 9$, then $n(x \times y) = \dots\dots\dots$
 A 6 B 18 C 11 D 7
- 5 The range of the set of the values 7, 3, 6, 9 and 5 =
 A 3 B 4 C 6 D 12
- 6 If $y \propto x$ and $y = 2$ when $x = 8$, then $y = 3$ when $x = \dots\dots\dots$
 A 16 B 12 C 24 D 6

Second:

- A If $X \times Y = \{ (2, 2) , (2, 5) , (2, 7) \}$. Find

First: Y .

Second: $Y \times X$

- B If a, b, c and d are proportional **prove that:**

$$\frac{a}{b-a} = \frac{c}{d-c}$$

Third:

A If $X = \{2, 3, 5\}$, $Y = \{4, 6, 8, 10\}$ and R is a relation from X to Y where aRb means " $2a = b$ " for all $a \in X$, $b \in Y$.

First: Write R and represent it by an arrow diagram.

Second: Show that R is a function.

B Find the number that if we add to each terms of the ratio $7:11$ it becomes $2:3$.

Fourth:

A If $X = \{1, 3, 5\}$ and R is a relation on X , where $R = \{(a, 3), (b, 1), (1, 5)\}$. **Find:**

First: The range of the relation.

Second: The value of $a + b$.

B If $Y \propto \frac{1}{x}$ and $y = 3$ when $x = 2$. **Find:**

First: The relation between x , y .

Second: The value of y when $x = 1.5$.

Fifth:

A Represent graphically the function $f(x) = (x-3)^2$, $X \in [0, 6]$ from the graph deduce the vertex of the curve, minimum value of the function, equation of the axis of symmetry.

B Calculate the arithmetic mean and the standard deviation of the set of values 8, 9, 7, 6 and 5.

ANSWER MODEL (1)

QUESTION (1)

- (1) Second
- (2) The standard deviation
- (3) $3a = 4b \Rightarrow a : b = 4 : 3$
- (4) $n(x \times y) = n(x) \times n(y) = 2 \times 3 = 6$
- (5) The range = max – mini = $9 - 3 = 6$
- (6) $\frac{2}{3} = \frac{8}{x} \Rightarrow x = \frac{8 \times 3}{2} = 12$

QUESTION (2)

(a) $Y = \{ 2, 5, 7 \}, X = \{ 2 \}$

$$Y \times X = \{ 2, 5, 7 \} \times \{ 2 \}$$

$$= \{ (2, 2), (5, 2), (7, 2) \}$$

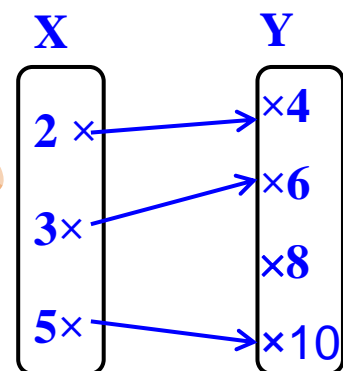
(b) $\frac{a}{b} = \frac{c}{d} = m \Rightarrow a = m c, b = m d$

$$\frac{a}{b - a} = \frac{mc}{md - mc} = \frac{\cancel{mc}}{\cancel{m}(d - c)} = \frac{c}{(d - c)}$$

QUESTION (3)

(a) $R = \{(2,4), (3,6), (5,10)\}$

R is a Function because each element of the set X appears only once as a first projection in one of the ordered pairs of the relation



(b) Let the number $= x$

$$\frac{X+7}{X+11} = \frac{2}{3} \Rightarrow 3(x+7) = 2(x+11)$$

$$3x + 21 = 2x + 22 \Rightarrow 3x - 2x = 22 - 21$$

$$\therefore x = 1 \quad \therefore \text{the number is } 1$$

QUESTION (4)

(a) The range $= \{3, 1, 5\}$

$\therefore R$ is a relation (function) on X

$$\therefore a = 3 \text{ or } 5 \quad \text{and} \quad b = 5 \text{ or } 3$$

$$a + b = 3 + 5 \text{ or } 5 + 3 = 8$$

(b) $Y \propto \frac{1}{x} \Rightarrow Y = \frac{m}{x} \Rightarrow m = yx = 3 \times 2 = 6$

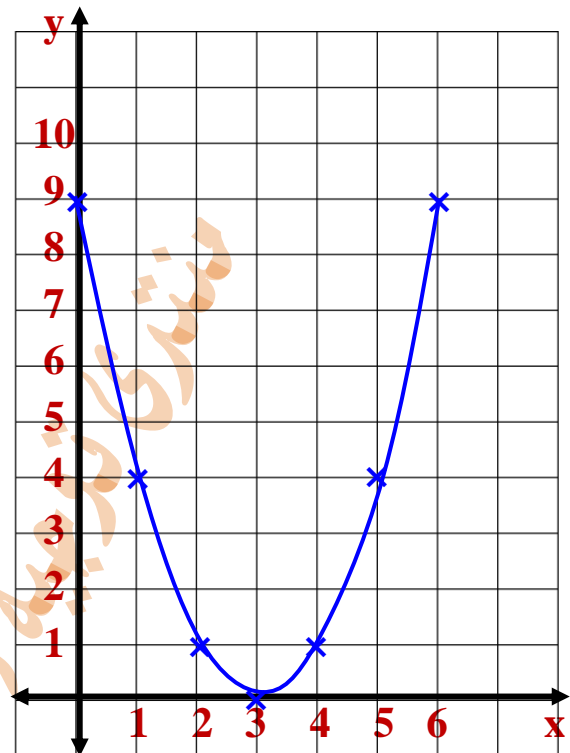
The relation $Y = \frac{6}{x}$

When $x = 1,5 \quad \therefore y = \frac{6}{1,5} = 4$

QUESTION (5)

(a)

X	$Y = (x - 3)^2$	y
0	$Y = (0 - 3)^2$	9
1	$Y = (1 - 3)^2$	4
2	$Y = (2 - 3)^2$	1
3	$Y = (3 - 3)^2$	0
4	$Y = (4 - 3)^2$	1
5	$Y = (5 - 3)^2$	4
6	$Y = (6 - 3)^2$	9



The vertex of the curve (3, 0)

The equation of symmetrical axis: $x = 3$

The minimum value = 0

$$(b) \quad x\backslash = \frac{9 + 8 + 7 + 6 + 5}{5} = 7$$

x	$x - x\backslash$	$(x - x\backslash)^2$
8	$8 - 7 = 1$	1
9	$9 - 7 = 2$	4
7	$7 - 7 = 0$	0
6	$6 - 7 = -1$	1
5	$5 - 7 = -2$	4
total		10

$$\sigma = \sqrt{\frac{\sum (x - x\backslash)^2}{n}} = \sqrt{\frac{10}{5}} = \sqrt{2}$$

MODEL (2)

First: Choose the correct answer from the given :

- 1 The point (3, 4) lies in quadrant:
 A first B second C third D fourth
- 2 is one of the measures of the dispersions.
 A The median B The arithmetic mean
 C The standard deviation D The mode
- 3 The third proportion of the two numbers 3 and 6 is
 A $\frac{1}{2}$ B 9 C 2 D 12
- 4 If $n(x) = 2$, $n(y \times x) = 6$, then $n(y^2) = \dots\dots\dots$
 A 4 B 9 C 16 D 12
- 5 The range of the set of the values 7, 3, 6, 9 and 5 =
 A 3 B 4 C 6 D 12
- 6 If $xy = 7$, then $y \propto \dots\dots\dots$
 A $\frac{1}{x}$ B $x - 7$ C x D $x + 7$

Second:

- A If $x = \{2, 5\}$, $Y = \{1, 2\}$, $Z = \{3\}$. Find:

First: $n(X \times Z)$.

Second: $(Y \cap X) \times Z$.

- B If b is a middle proportional between a and c prove that:

$$\frac{a-b}{a-c} = \frac{b}{b+c}$$

Third:

- A If $X = \{1, 3, 4, 5\}$, $Y = \{1, 2, 3, 4, 5, 6\}$ and R is a relation from X to Y where $a R b$ means $a + b = 7$ For all $a \in X$, $b \in Y$.

First: Write R and represent it by an arrow diagram.

Second: Show that R is a function.

- B If $5a = 3b$. Find the value of: $\frac{7a + 9b}{4a + 2b}$

Fourth:

- A If $f(x) = 4x + b$ and $f(3) = 15$ find the value of b .

- B If $Y \propto X$, $y = 6$ when $x = 3$. **Find:**

First: The relation between X , Y .

Second: The value of y when $X = 5$.

Fifth:

- A Represent graphically the function $f(x) = 4 - X^2$, $X \in [-3, 3]$ from the graph deduce the vertex of the curve, maximum value of the function, equation of the axis of symmetry.

- B The following frequency distribution shows the number of children of some families in a new city:

Number of children	0	1	2	3	4	sum
Number of families	6	15	40	25	14	100

Calculate the mean and the standard deviation to the number of children.

ANSWER MODEL (1)

QUESTION (1)

(1) First

(2) The standard deviation

$$(3) \frac{(6)^2}{3} = \frac{36}{3} = 12$$

$$(4) n(y) = \frac{6}{2} = 3 \Rightarrow n(y)^2 = (3)^2 = 9$$

$$(5) \text{ The range} = \text{max} - \text{mini} = 9 - 3 = 6$$

$$(6) y \propto \frac{1}{x}$$

QUESTION (2)

$$(a) n(x \times z) = n(x) \times n(z) = 2 \times 1 = 2$$

$$(y \cap x) \times z = \{2\} \times \{3\} = \{(2, 3)\}$$

$$(b) \frac{a}{b} = \frac{b}{c} = m \quad b = c m \quad , \quad a = c m^2$$

$$\frac{a - b}{a - c} = \frac{cm^2 - cm}{cm^2 - c} = \frac{\cancel{mc} (m - 1)}{\cancel{c} (m - 1) (m - 1)} = \frac{m}{(m - 1)}$$

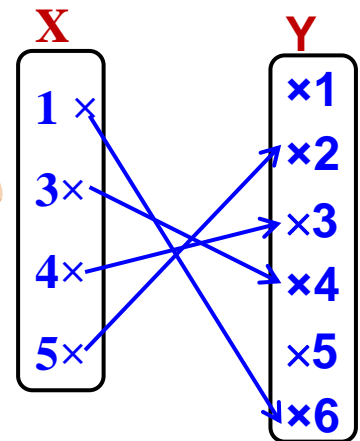
$$\frac{b}{b - c} = \frac{cm}{cm - c} = \frac{\cancel{mc}}{\cancel{c} (m - 1)} = \frac{m}{(m - 1)}$$

$$\therefore \frac{a - b}{a - c} = \frac{b}{b - c}$$

QUESTION (3)

(a) $R = \{(1, 6), (3, 4), (4, 3), (5, 2)\}$

R is a Function because each element of the set X appears only once as a first projection in one of the ordered pairs of the relation



(b) $5a = 3b \Rightarrow \frac{a}{b} = \frac{3}{5} = m \Rightarrow a = 3m, b = 5m$

$$\frac{7a + 9b}{4a + 2b} = \frac{7 \times 3m + 9 \times 5m}{4 \times 3m + 2 \times 5m} = \frac{21m + 45m}{12m + 10m} = \frac{66m}{22m} = 3$$

QUESTION (4)

(a) $F(x) = 4x + b$

$F(3) = 4 \times 3 + b = 15 \Rightarrow b = 15 - 12 = 3$

(b) $Y \propto x \Rightarrow Y = mx \Rightarrow 6 = 3 \times m$

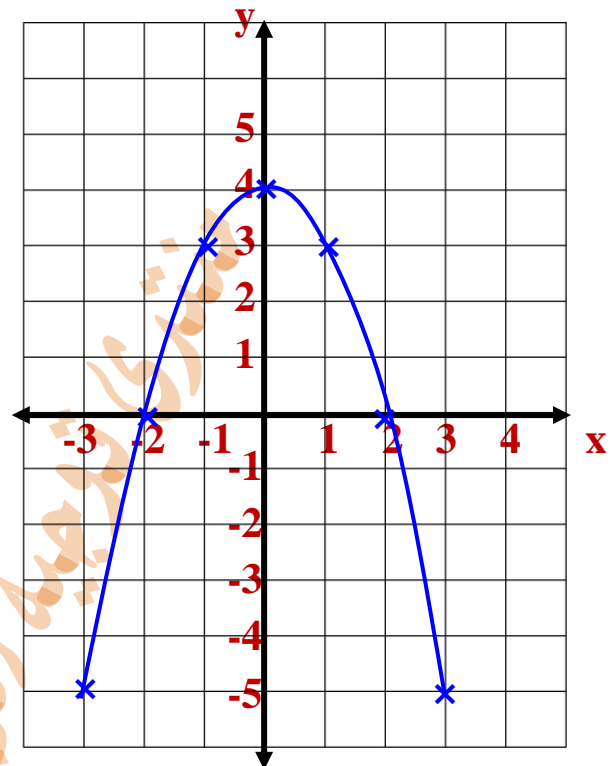
$\therefore m = 2 \Rightarrow \text{The relation } Y = 2x$

When $x = 5 \quad \therefore y = 2 \times 5 = 10$

QUESTION (5)

(a)

X	$Y = 4 - x^2$	y
-3	$Y = 4 - (-3)^2$	-5
-2	$Y = 4 - (-2)^2$	0
-1	$Y = 4 - (-1)^2$	3
0	$Y = 4 - (0)^2$	4
1	$Y = 4 - (1)^2$	3
2	$Y = 4 - (2)^2$	0
3	$Y = 4 - (3)^2$	-5



The vertex of the curve (0 , 4)

The equation of symmetrical axis: $x = 0$

The maximum value = 4

(b)

x	K	$X \times k$	$x - x\backslash$	$(x - x\backslash)^2$	$k. (x - x\backslash)^2$
0	6	0	$0 - 2,26 = - 2,26$	5,1076	30,6456
1	15	15	$1 - 2,26 = - 1,26$	1,5876	23,814
2	40	80	$2 - 2,26 = - 0,26$	0,0676	2,704
3	25	75	$3 - 2,26 = 0,74$	0,5476	13,69
4	14	56	$4 - 2,26 = 1,74$	3,0276	42,3864
total	100	226			113,24

$$x\backslash = \frac{\sum (x \cdot k)}{\sum k} = \frac{226}{100} = 2,26$$

$$\sigma = \sqrt{\frac{k \cdot \sum (x - x\backslash)^2}{\sum k}} = \sqrt{\frac{113,24}{100}} = 1,06$$

MODEL (3)

طلاب الدمج الإجابة في نفس الورقة

First: Complete:

(For the special needs)

- 1 The point (5, 3) lies in quadrant first
- 2 $n(x) = X^3 + 8$ is called a polynomail of degree thert
- 3 The range of the set of the values 4, 14, 25, and 34 is $34 - 4 = 29$
- 4 If $y = 2x$, then $y \propto$ $y \propto x$
- 5 If $X = \{2, 4, 6\}$, then $n(x^2) =$ $n(x) = 3 \Rightarrow n(x^2) = 9$
- 6 If $(a, 3) = (6, b)$, then $a + b =$ $6 + 3 = 9$

Second: Choose the correct answer:

- 1 If $xy = 7$, then $y \propto$

A $\frac{1}{x}$	B $x - 7$	C x	D $x + 7$
-----------------	-----------	-------	-----------
- 2 If 2, 3, 6 and X are proportional, then $x =$

A 9	B 18	C 12	D 3
-----	------	------	-----
- 3 If $2a = 5b$, then $\frac{a}{b} =$

A $\frac{-5}{2}$	B $\frac{-2}{5}$	C $\frac{2}{5}$	D $\frac{5}{2}$
------------------	------------------	-----------------	-----------------
- 4 is one of the measures of the dispersions

A the arithmetic mean	B The range
C the mode	D The median

5 If $n(x) = 5$, $n(x \times Y) = 10$, then $n(Y) = \dots\dots\dots$

A 4

B 3

C 2

D 1

6 If $x = \{1\}$, then $x^2 = \dots\dots\dots$

A 1

B (1,1)

C $\{(1,1)\}$

D $\{1\}$

Third: Put (✓) or (X):

1 If the relation of $f = \{(1, 3), (2, 4), (3, 3)\}$, then the domain of the function $\{1, 2, 3\}$ (✓)

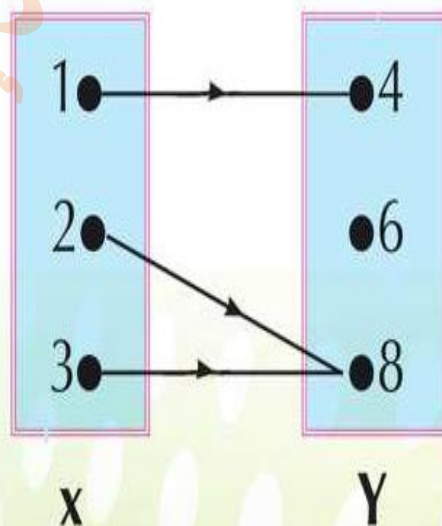
2 If $y \propto x$ and $y = 6$ when $x = 3$, then $y = 2$ when $x = 4$ (X)

3 If $\sum (x - \bar{x})^2 = 36$ for a set of values whose number equals 9, then $\sigma 4$ (X)

4 The intersection point of the straight line $f(x) = x + 2$ with x-axis is the point $(-2, 0)$ (✓)

5 If $f: x \longrightarrow Y$ then x is called the domain of this function (✓)

6 The arrow diagram from X to Y is a function (✓)



Fourth: join from Column (A) to Column (B):

A	B
<p>1 If $(1, 4) \in \{2, x\} \times \{1, 4\}$ Then $X = \dots\dots\dots$ <u>1</u></p>	<p>• 6</p>
<p>2 If The Function f Which $f(X) = X - 4$ is represented graphically By a Straight Line Passes through the Point $(a, 2)$ Then $A = \dots\dots\dots$ <u>6</u></p>	<p>• 1</p>
<p>3 $\frac{1}{2} = \frac{3}{6} = \frac{4}{8} = \frac{\dots}{16}$ <u>8</u></p>	<p>• 10</p>
<p>4 If $f(x) = 5$, then $f(5) + f(-5) = \dots\dots\dots$ <u>10</u></p>	<p>• ± 6</p>
<p>5 The third proportional of the two numbers 4 and 9 is $\dots\dots\dots$ <u>± 6</u></p>	<p>• 2</p>
<p>6 In the opposite figure the equation of the little of symmetry is $x = \dots\dots\dots$ <u>2</u></p> <div data-bbox="560 1272 975 1749"> </div>	<p>• 8</p>

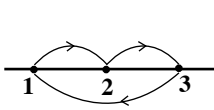
(1) Cairo

1 Complete each of the following:

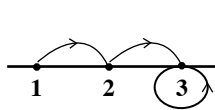
- a) If $\frac{a}{2} = \frac{b}{3} = 5$, then $a + b = \dots\dots\dots$.
- b) The range of the values 2, 9, 6, 16, and 8 is $\dots\dots\dots$.
- c) If 4, 6, and x are in proportion, then $x = \dots\dots\dots$.
- d) The point (1 , -1) lies on $\dots\dots\dots$ Quadrant.
- e) The positive square root of the average of squares deviations of values from the mean is called $\dots\dots\dots$.
- f) If $\frac{a}{\sqrt{3} - \sqrt{2}} = \frac{b}{\sqrt{3} - \sqrt{2}} = 1$, then $a b = \dots\dots\dots$.

2 Choose the correct answer:

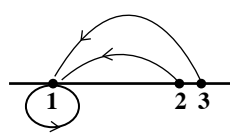
- a) If $X \times Y = \{(1, 3) , (1, 4)\}$ then $n(X) = \dots\dots\dots$ (1 , 2 , 3 , 4)
- b) In the opposite figures, if R is a function on $X = \{1, 2, 3\}$ of range $= \{1\}$, then the graph that represent it is $\dots\dots\dots$



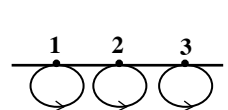
a)



b)



c)



d)

- c) If $f(x) = 4x + b$, $f(3) = 15$ then $b = \dots\dots\dots$ (156 , 3 , 4 , -3)
- d) If $\frac{y}{x} = 5$, then $y \propto \dots\dots\dots$ (x , $\frac{1}{x}$, x^5 , $\frac{1}{x^5}$)
- e) If $\frac{a}{b} = \frac{c}{d} = \frac{3}{4}$, then $\frac{a+c}{b+d} = \dots\dots\dots$ ($\frac{3}{4}$, $\frac{7}{4}$, $\frac{3}{7}$, $\frac{9}{16}$)
- f) Which of the following relations represents an inverse variation between the two variables x and y ? ($y = \frac{x}{7}$, $xy = 7$, $y = 7x$, $\frac{y}{x} = \frac{7}{2}$)

- 3 a) If $x = \{1 , 2 , 3\}$, $y = \{1 , 3 , 6 , 9 , 12\}$ and R is a relation from x to y where $a R b$ means " $a = \frac{1}{3} b$ " for all $a \in x$, $b \in y$. Write R and prove that R is a function and write its range.

- b) If $y \propto x$, $y = 6$ when $x = 3$, then find the relation between x and y .

- 4 a) Draw the function f where $f(x) = x(6 - x) + 4$, $x \in [-1 , 7]$

- b) If b is the middle proportional between a and c , then prove that: $\frac{a^2 + b^2}{b^2 + c^2} = \frac{a}{c}$

5 a) If $\frac{a}{2} = \frac{b}{5} = \frac{2a+b}{3x}$, then find the value of x.

b) Calculate the mean of the values : 2, 3, 6, 8, and 11 , then deduce their standard deviation.

(2) Giza

1 Complete the following:

a) If $n(X) = 5$, $n(X \times Y) = 15$ then $n(Y) = \dots\dots\dots$.

b) If $a = \sqrt{3}$, $b = \sqrt{2}$ then the value of $a^4 - b^4 = \dots\dots\dots$.

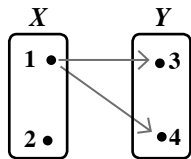
c) If $F : R \rightarrow R$, $f(x) = 3x$ represented by a straight line passing through $(-4, \dots)$

d) If $X = \{2, 3\}$ then $X^2 = \dots\dots\dots$. e) If $y = 3x$ then $y \propto \dots\dots\dots$.

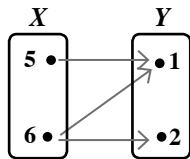
f) The range for the set 12 , 15 , 19 , 25 and 30 equals $\dots\dots\dots$.

2 Choose the correct answer:

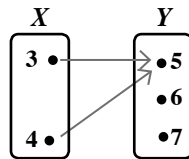
1) The diagram that represents a function is $\dots\dots\dots$.



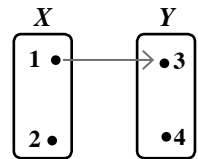
(a)



(b)



(c)



(d)

2) If $f(x) = x^3$, then $f(2) + f(-2) = \dots\dots\dots$.

a) 0

b) 2

c) 3

d) 8

3) The middle proportion between the two numbers 4 and 36 = $\dots\dots\dots$.

a) 32

b) 40

c) 12

d) ± 12

4) If $\frac{x}{3} = \frac{8}{12}$ then $x = \dots\dots\dots$.

a) 6

b) 5

c) 4

d) 2

5) The mean for the values 3, 4, 6 and 7 equals $\dots\dots\dots$.

a) 5

b) 10

c) 20

d) 40

6) If $\frac{x}{y} = \frac{2}{3}$ then $\frac{3x}{5y} = \dots\dots\dots$.

a) $\frac{2}{3}$

b) $\frac{2}{5}$

c) $\frac{3}{5}$

d) $\frac{5}{8}$

3 a) If $x = \{2, 3, 4, 7\}$, $y = \{1, 2, 3, 4, 7, 8\}$ and R is a relation from x to y where $a R b$ means that “a - b is a prime number” for all $a \in X, b \in Y$. Write R, represent it by an arrow diagram.

b) If $y \propto \frac{1}{x}$ and $y = 3$ when $x = 2$

Find: 1) The relation between x and y 2) The value of y when $x = 1.5$

4 a) Find the number that if subtracted thrice from the two terms of ratio $\frac{49}{69}$ the ratio becomes $\frac{2}{3}$.

b) Draw the function $f(x) = 4 - x^2$ where $x \in [-3, 3]$ then find:

i) max. point of $f(x)$ ii) equation of axis of symmetry.

5 a) If a, b, c and d are proportional. **Prove that:** $\frac{a-b}{b} = \frac{c-d}{d}$

b) The following frequency distribution shows the marks of 40 students in an exam:

Sets	0 –	4 –	8 –	12 –	16 - 20	Total
Frequency	2	5	8	15	10	40

Find: The standard deviation for this distribution.

(3) Alexandria

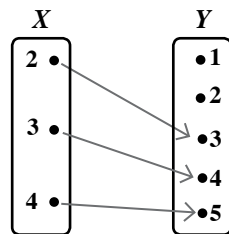
1 Choose the correct answer:

a) The middle proportional between 3, 27 is (–9 or 9 or ± 9 or 21)

b) **In the opposite function:**

Represents a function from $X \rightarrow Y$, then its range is

({2, 3, 4} or {2, 3, 5} or {3, 4, 5} or Y)



c) If y varies inversely with x and $x = \sqrt{3}$ when $y = \frac{2}{\sqrt{3}}$ then the constant of proportion equals ($\frac{1}{2}$ or $\frac{2}{3}$ or 2 or 6)

d) The most repeated value in a set of values represents is

(median or rang or mode or mean)

e) If $f(x) = 5x + 4$ represented by a straight line passing through (3, b) then $b = \dots\dots\dots$ (5 or 4 or 3 or 9)

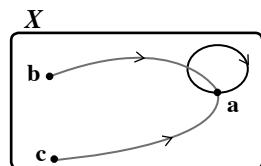
f) If $2a = 3b$ then $\frac{5b}{a} = \dots\dots\dots$ ($\frac{5}{3}$ or $\frac{5}{2}$ or $\frac{15}{2}$ or $\frac{10}{3}$)

2 Complete:

a) **In the opposite figure:**

Represents a function on X , its range =

- 1) {a} 2) {a, b, c}
3) {a, b} 4) {b, c}



- b) The range for the values 7, 4, 9, 5 and 13 is
- c) The function f where $f(x) = -3$, intersects Y-axis in the point (.....,)
- d) If $\frac{a}{b} = \frac{3}{2}$ then $\frac{a+b}{a-b} = \dots\dots\dots$
- e) The relation between the distance and time at uniform velocity is called variation.
- f) If $(x+5, 8) = (1, 64+x)$ then $y = \dots\dots\dots$
- 3** a) If the straight line which represents $F: \mathbb{R} \rightarrow \mathbb{R}$ where $f(x) = 6x - a$ cut y-axis at $(b, 3)$ find a, b
- b) If b is a middle proportional of a and c prove that $\frac{a^3 + b^3}{b^3 + c^3} = \frac{a^2}{bc}$
- 4** a) Find the number which if added to the two terms of ratio 7 : 11 it will be 2:3
- b) If $x = \{0, 1, 2, 3, 4, 5, 6\}$, R is a relation on x such that $a R b$ means “a twice b” for all $a, b \in x, a \neq b$.
- 5** a) If $x = L + 9$ and $L \propto y$ then find the relation between x and y know that $x = 24$, when $y = 5$, then find the value of y when $x = 12$.
- b) Calculate the standard deviation for the values : 12, 13, 16, 18, 21.

(4) Al Menofia

1 Choose the correct answer:

- a) If $n(x^2) = 9$ then $n(x) = \dots\dots\dots$ (1, 2, 3, 4)
- b) The range of values 1, 5, 12, 10, 9 and 5 is (5 or 7 or 10 or 11)
- c) If $\frac{a}{b} = \frac{b}{c} = \frac{c}{5} = 2$ then the value of $a = \dots\dots\dots$
(5×2^2 or 40 or 10 or 2×5^3)
- d) If $yx^2 = 5$ then y changes inversely with = ($\frac{1}{x^2}$ or $\frac{1}{x}$ or x or x^2)
- e) If $f(x) = 6x$, then $f(2) + f(-2) = \dots\dots\dots$ (0, 1, 12, 24)
- f) If $5a, 2, 3b$ and 7 are proportional quantities when $\frac{a}{b} = \dots\dots\dots$
($\frac{3}{7}$ or $\frac{6}{35}$ or $\frac{3}{5}$ or $\frac{3}{2}$)

2 Complete the following:

- a) If the standard deviation of a set of values equal zero then
- b) If $f(x) = 5x - 7$ then $f(3) = \dots\dots\dots$
- c) If $y \propto x$ and $y = 8$ when $x = 2$ so $y = \dots\dots\dots$ when $x = 3$

d) If $x \in \mathbb{R}^+$ and $(x^2 + 3)(x + \sqrt{3})(x - \sqrt{3}) = 7$ then $x = \dots\dots\dots$

e) If $\frac{x}{y} = \frac{3}{5}$ then $\frac{5x}{3y} = \dots\dots\dots$

f) If $(5, x-7) = (y+1, -5)$. Then $x + y = \dots\dots\dots$

3 a) If a, b, c and d are proportional quantities, **Prove that:** $\frac{d}{c+d} = \frac{b}{a+b}$

b) Graph $f(x) = -x^2 + 1, x \in [-3, 3]$

4 a) If $y \propto \frac{1}{x}$, $y = 6$ at $x = 3$

1) **Find:** the relation between x, y

2) **Find:** y at $x = 2$

b) IF $x = \{1, 3, 5\}$ and R is a function on x where $R = \{a, 3\}, (b, 1), (1, 5)\}$ then find $a + b$. **Find** the value of: $\frac{x^3 - y^3}{x - y}$

5 a) If b is a middle proportional between a and c .

Prove that: $\frac{a^2 + b^2}{b^2 + c^2} = \frac{a}{c}$

b) The following frequency distribution shows the number of goals scored in 30 matches.

Number of goals	zero	1	2	3	4	5
Number of matches	1	4	5	9	6	5

Find the mean and the standard deviation for the number of goals.

(5) Al Gharbia

1 Complete the following:

a) The point $(-1, 1)$ lies on the quadrant.

b) If $n(X) = 3, n(X \times Y) = 12$, then $n(Y) = \dots\dots\dots$

c) If $ad = bc$ then $\frac{a}{c} = \dots\dots\dots$

d) The middle proportional between 4 and 9 =

e) The range for the values 7, 4, 9, 5, 13 is

f) If $xy = -5$ then $y \propto \dots\dots\dots$

2 Choose the correct answer from those between brackets:

a) If $x \times y = \{(1, 3), (1, 4)\}$ then $n(x) = \dots\dots\dots$ (1, 2, 3, 4)

b) If $X = \{3, 4\}, Y = \{5, 6, 2\}$, then $(6, 4) \in \dots\dots\dots (X \times Y, Y \times X, X^2, Y^2)$

c) The fourth proportional for the numbers 2, 6, 9 is

(12 or 18 or 27 or 54)

- d) If $y \propto x$ and $y = 6$ at $x = 2$ then $y = \dots\dots\dots$ when $x = 3$.
 (6 or 9 or 12 or 18)
- e) The mean for 30 , 20 , 50 , 60 is (25 or 40 or 50 or 55)
- f) If $\frac{a}{b} = \frac{3}{2}$ then $\frac{a-b}{a+b} = 2$ then the value of $a = \dots\dots\dots$.
 ($\frac{3}{2}$ or 5 or $\frac{1}{5}$ or $\frac{2}{3}$)

- 3** a) Two integer numbers, the ratio between them is 3:7 and if subtracted 5 from each term, the ratio between each of them becomes 1:3. Find the two numbers.
- b) If $x = \{2, 4, 8\}$, $y = \{4, 6, 12, 24\}$ and R is a relation from x to y . Where aRb means $b > 2a$ for all $a \in x, b \in y$ write R , represent it by an arrow diagram, Cartesian diagram.
- 4** a) If a, b, c and d are four proportional quantities. Prove that $\frac{ac}{bd} = \left(\frac{a-c}{b-d}\right)^2$
- b) If $y \propto \frac{1}{x}$ and $y = 2$ when $x = 4$.
Find: 1) The relation between x and y . 2) The value of y when $x = 16$.
- 5** a) Draw the function $f(x) = 2 - x^2$ where $x \in [-3, 3]$ then find:
 i) max. point of f ii) equation of the axis of symmetry.
- b) Calculate the standard deviation for the values: 6 , 7 , 8 , 9 and 10.

(6) Al Dakahlia

1 Complete the following:

- a) If $Y \propto X$ and $Y = 6$ when $X = 4$ then $\frac{Y}{X} = \dots\dots\dots$.
- b) The linear function $y = 2x - 1$ represented by a straight line cut y-axis at
- c) The arithmetic mean of the values 4 , 13 , 18 , 25 , 30 is
- d) If $\frac{a}{b} = \frac{7}{4}$ then $\frac{4a}{b} = \dots\dots\dots$.
- e) One third the number 3^{18} in the form a^n is
- f) If 1 , x , 9 , y are in continued proportion then $x = \dots\dots\dots$, $y = \dots\dots\dots$, where x, y are + ve.

2 Choose the correct answer:

- 1) Biggest value - smallest value for a given data is
 a) Median b) Range c) Mode d) Standard deviation
- 2) If $\frac{a}{5} = \frac{b}{2} = \frac{a-2b}{k}$ then $k = \dots\dots\dots$.
 a) 5 b) 2 c) 3 d) 1

3) If $n(x^2) = 9$ then $n(x) = \dots\dots\dots$

- a) 3 b) 6 c) 18 d) 81

4) If $1 + 4x^2y^2 = 4 \times y$ then $\dots\dots\dots$

- a) $y \propto \sqrt{x}$ b) $y \propto \frac{1}{x}$ c) $y \propto x$ d) $y \propto \frac{1}{x^2}$

5) The value of x which satisfies the equation $2^x + 2^{x+1} = \frac{2}{3}$ is $\dots\dots\dots$

- a) 1 b) zero c) -1 d) 2

6) If the function $f(x) = 6$, then $\frac{f(3)}{f(a)} = \dots\dots\dots$

3 a) If $\frac{x+y}{5} = \frac{y+z}{3} = \frac{x+z}{6}$ prove that: $\frac{x-z}{2} = \frac{x+y+z}{7}$

b) If $x = z + 8$ and $z \propto \frac{1}{y}$ and it $z = 2$ when $y = 3$, Find y at $x = 3$

4 a) If $x = \{0, 1, 2, 3, 4, 5, 6\}$, $y = R$ is a relation on x such that $a R b$ means "a twice b" all $a, b \in x$, $a \neq b$.

i) Write R , represent it by an arrow diagram.

ii) Is $(0,0) \in R$?

iii) Is $2 R 4$?

iiii) find x if $6 R x$

b) If a, b, c, d are in continued proportion **prove that:** $\frac{ab - dc}{b^2 - c^2} = \frac{a + c}{b}$

5 a) Draw the function $f(x) = x(6 - x) + 4$ on the interval $[-1, -7]$

b) The following table shows the number of goals scored in football matches.

Number of goals	zero	1	2	3	4	5	6
Number of matches	1	4	6	9	5	3	2

calculate the standard deviation of number of goals.

(7) Behera

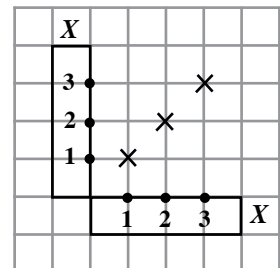
1 Choose the correct answer:

1) In the opposite figure:

The Cartesian diagram of a function on X ,

then its range = $\dots\dots\dots$

- a) $\{1, 2, 3\}$ b) $\{2, 1\}$
c) X d) $\{3\}$



2) The function $y = x + 3$ represented by a straight line cut x -axis at $\dots\dots\dots$

- a) -3 b) -2 c) 0 d) 3

- 3) If $x = \{5\}$, $y = \{3\}$ then $n(x \times y) = \dots\dots\dots$.
 a) 15 b) 8 c) 2 d) 1
- 4) The fourth proportional for the numbers 8 ,6 and 4 is
 a) 2 b) 3 c) 4 d) 7
- 5) The range for the values 7, 4, 9, 5 and 13 is
 a) 6 b) 7 c) 9 d) 5
- 6) If $\frac{a}{b} = \frac{5}{4}$ then $\frac{a+b}{a-b} = \dots\dots\dots$.
 a) $\frac{5}{4}$ b) 9 c) $\frac{4}{5}$ d) 2

2 Complete the following:

- a) If $f(x) = 3x + b$, $f(4) = 13$ then $b = \dots\dots\dots$.
- b) If $x + \frac{1}{x} = 2$ where $x \neq 0$, then $x^2 + \frac{1}{x^2} = \dots\dots\dots$.
- c) The quantities a , b and c are said to be in continued proportional if $\frac{a}{b} = \dots\dots\dots$
- d) If $y \propto x$ and $y = 6$ at $x = 2$ then $y = \dots\dots\dots$ when $x = 12$
- e) The positive square root to the average of squares deviations of values from the mean is called
- f) The proportion is the equality of

3 a) If $x = \{1, 2, 4\}$ and R is relation on x where $a R b$ means “ a is a multiple of b ” for all $a, b \in x$. Write R , represent it by an arrow diagram. Is R a function.

- b) If b is a middle proportional between a and c

Prove that: $\frac{a^3 + b^3}{b^3 + c^3} = \frac{a^2}{bc}$

4 a) If $\frac{x}{y} = \frac{3}{5}$ = find the value of the ratio: $\frac{3x - y}{5y - 2x}$

- b) If $Y \propto \frac{1}{X}$ and $Y = 5$ when $X = 15$

First: Find the relation between X and Y

Second: Find the value of X when $Y = 10$

5 a) If 5, 6, 7, 8 and 9 represent the marks of a pupil in mathematics test in 5 months.

Find the mean and the standard deviation.

- b) Draw the function $f(x) = 1 - x^2$ where $x \in [-3, 3]$ then find:

- i) max. point of $f(x)$ ii) equation of the axis of symmetry.

(8) Damietta

① Choose the correct answer from the given answers:

1. If $f(x) = 2x$ represented by a straight line passing through $(-3, \dots)$
a) -6 b) -5 c) -3 d) 2
2. The point $(-2, 1)$ lies on the quadrant
a) 1^{st} b) 2^{nd} c) 3^{rd} d) 4^{th}
3. The point $(3, 0)$ lies on axis
a) 0 b) 1 c) 2 d) 3
4. If $x + \frac{1}{x} = 2$ then $x^2 + \frac{1}{x^2} = \dots$
a) 4 b) 2 c) zero d) 5
5. If $\sum (x - \bar{x})^2 = 144$ for set of values whose number is 9 then $\sigma = \dots$
a) 16 b) 4 c) 12 d) 9
6. If $x : y = 3 : 2$, $y : z = 4 : 5$ then $x : y : z = \dots$
a) $2 : 4 : 5$ b) $6 : 4 : 5$ c) $4 : 6 : 5$ d) $10 : 12 : 15$

② Complete to make the following statements correct:

- a) The proportion is
- b) The most accurate measure of the dispersions is
- c) The middle proportional between the two numbers $4, 9$ equals
- d) If $3a - 2b = \text{zero}$ then $\frac{a}{b} = \dots$
- e) If $f(x) = x^2 + 7$ then $f(3) = \dots$
- f) If $y \propto \frac{1}{x}$ and $y = 3$ when $x = 20$ then $x = 12$ when $y = \dots$

- ③ a) If $x = \{2, 4, 8\}$, $y = \{4, 6, 12, 24\}$ and R is a relation from x to y where aRb means $b > 2a$ for all $a \in x, b \in y$ write R , represent it by an arrow diagram, Cartesian diagram.

Then find the value of the result when $x = 1$.

- b) If $2a = 5b$ find the value of: $\frac{8a^2 - ab}{4ab + 5b^2}$

- ④ a) Draw the function $f(x) = x^2 - 4$ where $x \in [-3, 3]$ then **find**:

- i) max. point.
 - ii) equation of the axis of symmetry.
- b) If $y \propto x$ and $y = 14$ when $x = 42$ **Find**:
- 1) The relation between y and x .
 - 2) Value of y when $x = 20$

5 a) If $\frac{a}{4x+y} = \frac{b}{x-4y}$ prove that: $\frac{a+b}{5x-3y} = \frac{a-b}{3x+5y}$

b) The following table shows frequency distribution of the number of goals scored by 100 players in five penalties:.

Number of goals	zero	1	2	3	4	5	Total
Number of players	3	16	17	25	20	19	100

Calculate the mean and the standard deviation to the number of recorded goals.

(9) Port Said

1 Complete the following:

a) From the data of the following table:

X	3	5	6	10
Y	10	6	5	3

The kind of variation between y and x is

b) The point (0 , 4) lies on axis.

c) If the mean of the values: 10, x, 18 , 12 equal 15 then x =

d) If $y \propto x$ then $y = \dots\dots\dots$

e) Resources of collecting data are,

f) The middle proportional between 2 , 18 , is

2 Choose the correct answer:

1) If $xy = \{(1,3) , (1,4)\}$ then $n(x) = \dots\dots\dots$

a) 1 b) 2 c) 3 d) 4

2) If $(2, b) \in f$ where $f(x) = 3x - 6$ then $b = \dots\dots\dots$

a) 0 b) 2 c) 7 d) 9

3) If $\frac{a}{2} = \frac{b}{3} = \frac{c}{4} = \frac{2a-b+c}{x}$ then $x = \dots\dots\dots$

a) 9 b) 8 c) 7 d) 5

4) If $a = \sqrt{5}$, $b = \sqrt{7}$ then $a^4 \times b^{-4} = \dots\dots\dots$

a) $\frac{7}{5}$ b) $\frac{5}{7}$ c) $\frac{25}{49}$ d) $\frac{49}{25}$

5) If $(x-5 , 7-x)$ lies on the 2nd quadrant then $x = \dots\dots\dots$

a) 3 b) 5 c) 7 d) 9

6) If $y \propto \sqrt{x}$ and $y = 5$ when $x = 9$ then $y = \dots\dots\dots$

a) 5x b) $\frac{5}{3}x$ c) 3x d) $\frac{3}{5}x$

- 3 a) Represent graphically the function $f(x) = (x-3)^2$ where $x \in [0, 6]$ and from the graph find the vertex point and max. and minimum point at the function.

b) If $\frac{a+b}{3} = \frac{2b+c}{6}$ = prove that : $c \propto a$

- 4 a) If $x = \{1, 2, 5, 7\}$, $y = \{2, 3, 7, 8\}$ and R is a relation from x to y where a $R b$ means “ $a+b$ is an odd number” for all $a \in x$, $b \in y$ write R and represent it by an arrow diagram.

- b) If a, b, c and d are four real proportional quantities. Then prove that:

$$\frac{ac}{bd} \left(\frac{a-c}{b-d} \right)^2$$

- 5 a) If y changes inversely with x and $y = 2$ when $x = 4$ then

Find the value of y when $x = 16$

- b) The following frequency distribution shows the ages of 20 children.

Ages in year	2	4	6	8	10	Total
Number of children	3	4	7	5	1	20

Calculate: The standard deviation to ages in years.

(10) Suez

1 A) Complete:

1. The point $(5, -3)$ lies on the quadrant.

2. If $x = \{5, 6, 7\}$ then $n(x^2) = \dots\dots\dots$

3. If $y \propto x^2$ then $\frac{y_1}{y_2} = \dots\dots\dots$

B) If $x = \{0, 1, 2, 3, 4, 5, 6\}$, R is a relation on x such that a $R b$ means “ a twice b ” for all $a, b \in x$, $a \neq b$, then $R = \dots\dots\dots$

2 A) Complete:

1. The middle proportion for the values 1 and 4 equals

2. The mean for the values 4, 3, 2, 5, 1 is

3. If $f(x) = 5x - 7$ then $f(3) = \dots\dots\dots$

B) If $\frac{x}{y} = \frac{2}{3}$ Find the value of the ratio $\frac{6x - 2y}{y - x}$.



3 (A) Choose the correct answer:

- If $f(x) = x^3$ then $f(2) + f(-2) = \dots\dots\dots$ (zero or $\frac{1}{2}$ or 1 or 2)
- The range for the values 2 , 13 , 12 , 16 and 14 is $\dots\dots\dots$ (2 or 13 or 14 or 16)
- If $(2, -6) \in f$ where $f(x) = kx$, then $k = \dots\dots\dots$ (-1 or -2 or -3 or 3)

B) Represent graphically $f(x) = 2 - x$

4 (A) Choose the correct answer from the given answers:

- If $f(x) = 5x - 7$ then $f(3) = \dots\dots\dots$ (1, 5 , 7 , 8)
- If $\frac{A}{B} = \frac{3}{4}$ then $4A - 3B + 5 = \dots\dots\dots$ (0 or 1 or 3 or 5)
- If $y = \frac{-3}{x}$ then $\dots\dots\dots$ ($y = x$ or $y \propto x$ or $y \propto \frac{1}{x}$ or $yx = 0$)
- If a, b, c and d is continued proportional. **Prove that** $\frac{a+c}{b+d} = \frac{b}{c}$

5 a) If $Y \propto \frac{1}{X}$ and $Y = 1$ when $X = 2$.

Find: 1) The relation between X and Y . 2) The value of X when $Y = 4$.

b) The following distribution for the marks of some students in one of the exams:

Marks	0	1	2	3
Number of students	1	2	3	4

Find: 1) The mean. 2) The standard deviation for the marks of the students.

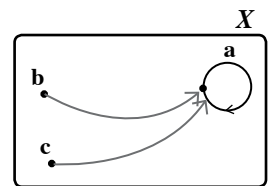
(11) Al Fayoum

1 Choose the correct answer between brackets:

a) In the opposite figure:

The range of the function = $\dots\dots\dots$

- $\{a\}$
- $\{a, b\}$
- $\{a, b, c\}$
- $\{b, c\}$



- The point $(7, -9)$ lies on the $\dots\dots\dots$ quadrant. (1^{st} , 2^{nd} , 3^{rd} , 4^{th})
- If $f(x) = x^7 - 3x^2$, then its degree = $\dots\dots\dots$

d) The positive middle proportional between the two numbers 2 , 8 equals $\dots\dots\dots$ (6 or 4 or -4 or 16)

e) If $\frac{x}{5} = \frac{y}{7}$ then the expression $7x - 5y + 9 = \dots\dots\dots$ (4 or 7 or 9 or $\frac{5}{7}$)

- f) From the secondary resources to collect data is the
(interview or questionnaires or personnel database or observation and measurement)

2 Complete each of the following to get correct statements:

- a) The difference between the greatest value and the smallest value the set is called
b) The fourth proportional of the numbers 4 , 3 , 8 is
c) If $\frac{5a - 7b}{8a + 11b} = \text{zero}$ then $\frac{b}{a} = \dots\dots\dots$.
d) If $y \propto x$ and $y = 2$ when $x = 8$ then $y = \dots\dots\dots$ when $x = 12$.
e) The point (3 , 0) lies on axis.
f) If $f(x) = ax + b$, $f(y) = 13$ then $b = \dots\dots\dots$.

3 a) Graph $f(x) = x^2 - 6x + 9$, $x \in [0, 6]$.

- b) If $\frac{x + y}{7} = \frac{x + z}{5} = \frac{z + x}{8}$ Prove that $\frac{x + y + z}{x - z} = 5$

4 a) If b is a middle proportional between a , c Prove that: $\frac{c}{a} = \frac{c^2}{b^2}$

- b) If $y \propto \frac{1}{x}$ and $y = 3$ when $x = 2$ Find:

- 1) The relation between x , y . 2) The value of y when $x = 1\frac{1}{2}$

5 a) If $x = \{1, 3, 4, 5\}$, $y = \{1, 9, 3, 4, 5, 6\}$ and R is a relation from x to y where a R b means “a + b = 7” for every $a \in x$, $b \in y$ write R and represent it by an arrow diagram and Cartesian diagram. Is R a function? Why?

- b) The following is a frequency distribution which shows the number of children of some families in one of the new cities

Number of children	zero	1	2	3	4	Total
Number of families	5	7	7	5	6	30

Calculate the mean and the standard of the number of children

(12) Aswan

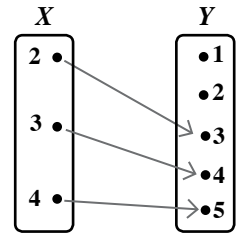
1 Choose the correct answer from the given ones:

- 1) The difference between the greatest value and the smallest value in the set called
a) median b) the range c) mode d) mean

2) In the opposite function:

Represents a function from $X \rightarrow Y$, then its range is

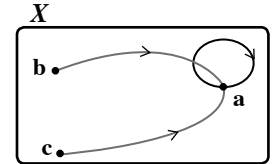
- a) $\{2, 3, 4\}$ b) $\{2, 3, 5\}$
c) $\{3, 4, 5\}$ d) Y



3) In the opposite figure:

Represents a function on X , its range =

- a) $\{a\}$ b) $\{a, b, c\}$
d) $\{a, b\}$ d) $\{b, c\}$



4) Which relation represents the inverse variation between y and x

- a) $y = 5x + 1$ b) $y = \frac{1}{2}x$ c) $xy = 7$ d) $\frac{x}{y} = \frac{2}{3}$

5) The mean for the values 2, 5, 7 and 10 is

- a) 2 b) 8 c) 4 d) 6

2) Complete the following statements:

- 1) If $y = 2x$, then $y \propto$
- 2) If the function $f : f(x) = -2$, then $f(x + 2) =$
- 3) If $5a = 7b$, then $\frac{b}{a} =$
- 4) If 2, x , 4, 6 are proportional quantities, then $x =$
- 5) The value of the expression $2^{\text{zero}} + 2^{-1} - \left(\frac{-1}{\sqrt{2}}\right)^2 =$
- 6) If $\frac{a}{3} = \frac{b}{5} = \frac{a+b}{2x}$, then $x =$

3) a) Graph $f(x) = x^2 - 2x$, $x \in [-1, 3]$.

b) The point $(-1, -1)$ is located in the quadrant.

- a) first b) second c) third d) fourth

4) a) First

x	3	5	4
y	20	12	15

1) From the opposite table write the type of variation that data represents between y and x .

2) Write the relation between y and x .

b) Find x when $y = 40$

5 a) First: If $y \propto x$ and $y = 6$ when $x = 2$, find the value of y when $x = 5$

Second: Calculate the standard deviation of the following values 12, 14, 16 and 18.

b) Find the two numbers which the ratio between them equals $7 : 12$, and one of them is more than the other by 275.

(13) Kafr El-Sheikh

1 Choose the correct answer:

1) The middle proportional between $3b$, $12a^2b$ is ($-6a$, $\pm 6b$, $\pm 6ab$, ab)

2) If $\frac{a}{b} = \frac{2}{5}$, then $\frac{a-b}{a+b} = \dots\dots\dots$ ($\frac{3}{7}$, $-\frac{3}{7}$, $\frac{7}{3}$, $-\frac{7}{3}$)

3) The range of the set of values: 8, 3, 5, 12, 10 is (7, 8, 9, 10)

4) If the point $(3, a)$ lies on the X-axis then $a = \dots\dots\dots$
(-3 , 3 , zero, 2)

5) The fourth proportional of the numbers 2, 5, 8 is (20, 22, 25, 30)

6) If y varies inversely with \sqrt{x} and $y = 3$ when $x = 16$,

Then the constant of variation = ($\frac{4}{3}$, $\frac{3}{4}$, -12 , 12)

2 Complete:

1) If $f(x) = x^3 - (5 + x^3)$ of degree.

2) If a weight of a body on the earth (R) directly changes with its weight on the moon (W). If $R_1 = 182$ kg, $W_1 = 35$ kg, then find W_2 when $R_2 = 312$ kg.

3) If 15 workers need 16 days to finish a certain job. How many workers are needed to finish the same job in 12 days?

4) A car moves with a uniform velocity, where the covered distance varies directly with the time. If the car covers a distance 120 km in 5 hr. Find the distance covered by that car in 8 hr.

5) If Y varies directly as x and inversely as z , then $y \propto \dots\dots\dots$

6) $f(x) = x^2 - 10x + 25$, then $f(4) - f(6) = \dots\dots\dots$

7) If the mean of numbers: $3a - 3$, $3a - 1$, $2a + 1$, $2a + 3$, $2a - 6$ is 6 then $a = \dots\dots\dots$

8) If $x^2 - 4xy + 4y^2 = 0$, then $y \propto \dots\dots\dots$

3 If $\frac{a}{2} = \frac{b}{3} = \frac{c}{4}$, find the value of $\frac{2a - b + 5c}{3b - a}$

4 a) If: $Y \propto \frac{1}{x}$, where $y = 2$ when $x = 3$

Find the relation between y and x , then find the value of y when $x = 12$

b) Graph $f(x) = -x^2$, $x \in [-2, 2]$

5 a) If the number of hours (y) is proportionally inverse with the number of workers (x), and 66 workers fulfilled the work in 4 hours. What is the time needed for 8 workers to fulfill this work?

b) **Find** the standard deviation (show steps)

Degree	5	8	9	10	12	Total
Frequency	1	2	3	3	1	10

Answer the following questions : (calculators is allowed)

[Q1] Choose the correct answer from those given:

1- If $n(X) = 3$, $n(X \times Y) = 21$ then $n(Y) = \text{-----}$

- (a) 5 (b) 7 (c) 21 (d) 3

2- If $8^{x-9} = 1$, then $X = \text{-----}$

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- (a) 8 (b) zero (c) 9 (d) 1

3- If $XY = 4$, then $Y \propto \text{-----}$

- (a) $X - 4$ (b) X (c) $\frac{1}{X}$ (d) $X + 4$

4- The solution set of the equation $X^2 + 9 = 0$ in R is--

- (a) $\{ 3 \}$ (b) $\{ -3 \}$ (c) $\{ -3 , 3 \}$ (d) \emptyset

5- The range of the set of the values 6,5,9,13,10 is --

- (a) 8 (b) 5 (c) 9 (d) 10

6- If $\frac{2X}{5} = 6$ then $3x = \text{-----}$

- (a) 30 (b) 45 (c) 12 (d) 15

[Q2]

A) If $X = \{ 2, 5, 7 \}$, $Y = \{ 1, 3, 6, 11 \}$ and R is
a relation from X to Y Where " $a R b$ " means
" $a + b = 8$ " for each $a \in X$, $b \in Y$.

1. Write R and represent it by an arrow diagram.
2. Show that R is a function and find its range.

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B) If $\frac{X}{Y} = \frac{4}{3}$, Find the value of : $\frac{3X + 2Y}{6Y - X}$

In the simplest form .

[Q3]

A) If $Y \propto X$ and $Y = 16$ when $X = 4$, Find:

1) The relation between Y and X

2) Find the value of Y where $X = 5$

B) If b is the middle proportion between a and c

prove that
$$\frac{a-b}{b} = \frac{a-c}{b+c}$$

[Q4]

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A) If $(X+5, 7) = (8, Y+3)$

Find the value of $\sqrt{x^2 + y^2}$

B) If 3, b, 12 are three positive proportional quantities .

Find the value of $4b+1$

[Q5]

A) Represent graphically the function F where

$$F(X) = X^2 - 3 \text{ taking } X \in [-3, 3], \text{ from the}$$

graph deduce:-

1- The coordinates of the vertex of the curve.

2- The minimum value of the function and

The equation of the axis of symmetry

B) Find the standard deviation for the

values 8, 9, 7, 6, 5

انتهت الأسئلة مع التمنيات بالتوفيق

ISMAILIA GOVERNORATE
DIRECTORATE OF EDUCATION
BASIC EDUCATION CERTIFICATE EXAMINATION
FIRST SESSION EXAM 2020

Mathematics
Abil Rashed

MATHS (ALGEBRA AND STATISTICS)

TIME : 2 HOURS

تنبيه : الأسئلة في ورقة واحدة من الوجهين

ANSWER THE FOLLOWING QUESTIONS (استخدم الآلة الحاسبة)

QUESTION 1:

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Choose the correct answer from those given answers:

✓ ① $\sqrt{36} + \sqrt{16} = \dots\dots\dots$

a) 10

b) 24

c) 52

d) 100

✓ ② The middle proportional between 3 , 27 is

a) 9

b) -9

c) ± 9

d) 1

✓ ③ If $f(x) = 2$ then $f(2) + f(-2) = \dots\dots\dots$

a) zero

b) 4

c) -4

d) 1

✓ ④ The positive number which twice its square = 50 is

a) 5

b) 10

c) 25

d) 100

✓ ⑤ If $x + y = xy = 5$, then $x^2 y + y^2 x = \dots\dots\dots$

a) 10

b) 15

c) 20

d) 25

✓ ⑥ The simplest and easiest method of measuring dispersion is

a) the range

b) the standard deviation

c) the arithmetic mean

d) the mode

QUESTION 2: $2 \times 2 = 4$ $2 \times 5 = 10$
 $2 \times 3 = 6$

✓ [A] If $X = \{ 2, 3, 5 \}$, $Y = \{ 4, 6, 8, 10 \}$ and R is a relation from X to Y where
" aRb " means " $2a = b$ " for all $a \in X, b \in Y$.

✓ (1) Write R and represent it by an arrow diagram .

✓ (2) Is the relation R represents a function ? Why ? and If it's a function find its range .

✓ [B] The ratio between two integers is 3:7 , If 5 is subtracted from each of them , then the ratio becomes 1 : 3 , Find the two numbers .

QUESTION 3:

[A] As Yousef was reading a book, He found out after 3 hours 50 pages remained, after 6 hours 20 pages remained.

If there was a relation between time (t) and the number of pages (Y).

Is a linear relation

① Represents the relation between (t), (Y), Then find the algebraic relation between them.

✓ ② How much time did Yousef takes to finish reading the book?

✓ ③ How many pages left when Yousef started reading?

[B] If x, y, z and L are proportional quantities

✓ Prove that : $\frac{y-x}{x} = \frac{L-Z}{Z}$

QUESTION 4:

[A] If $y \propto x$ and $y = 40$ at $x = 14$

✓ Find the relation between x and y, then Find the value of x when $y = 80$?

✓ [B] If $X \times Y = \{(1,2), (1,3), (2,2), (2,3)\}$

Find : ① $X \cup Y$ ✓ ② $n(Y^2)$

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QUESTION 5:

[A] Represent graphically the function f :

$$f(x) = (x - 2)^2, \text{ Taking } x \in [-1, 5]$$

And from the graph Find :

✓ ① The coordinates of the vertex of the curve.

✓ ② The equation of the line of symmetry.

✓ ③ The maximum or the minimum value of the function.

✓ [B] Find the standard deviation for the following set of values :

✓ 13, 14, 17, 19, 22

إنتهت الأسئلة



تنبيه : أسئلة هذا الامتحان في صفحتين - يسمح باستخدام الآلة الحاسبة .

Answer the following questions :

First question : Choose the correct answer :

- 1) If $n(x^2) = 9$, $n(x \times y) = 6$ then $n(y) = \dots\dots\dots$
(2 , 3 , 4 , 6)
- 2) If $xy = 3$ then $y \propto \dots\dots\dots$
($3x$, $\frac{3}{x}$, $\frac{1}{x}$, $\frac{x}{3}$)
- 3) $[2, 5] - \{2, 5\} = \dots\dots\dots$
($[1, 6]$, ϕ , $]2, 5[$, $\{0\}$)
- 4) $\sqrt{50} - \sqrt{8} = \dots\dots\dots$
($\sqrt{200}$, $\sqrt{98}$, $\sqrt{42}$, $\sqrt{18}$)
- 5) If $\sum (x - \bar{x})^2 = 48$ of a set of values and the number of these value = 12
then $\sigma = \dots\dots\dots$
(-2 , 2 , 4 , 6)
- 6) If $x - y = 5$, $x + y = \frac{1}{5}$ then $x^2 - y^2 = \dots\dots\dots$
($\frac{1}{25}$, 1 , 5 , 25)

الامتحان التعليمي
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Second question :

- A) If $x = \{1, 3, 4, 5\}$, $y = \{1, 2, 3, 4, 5, 6\}$ and R is a relation from x to y
where "aRb" means $(a + b = 7)$ for each $a \in x$, $b \in y$
(1) Write R and represent it by an arrow diagram.
(2) Is R a function ? and why ?
- B) If $y \propto x$ and $y = 6$ when $x = 3$
Find : (1) The relation between x and y
(2) The value of y when $x = 5$

Third question :

- A) Represent graphically the function $f : f(x) = 4 - x^2$ taking $x \in [-3, 3]$ and from
the graph deduce : The coordinates of the vertex point of the curve, maximum
value of the function and the equation of line of symmetry.
- B) Find the positive number which its square is added to the antecedent of
the ratio 29 : 46 and subtracted its square from its consequent the ratio
become 3 : 2

Fourth question :

- A) If the straight line which represents the function $f: \mathbb{R} \rightarrow \mathbb{R}$, $f(x) = 6x - a$ intersects the y-axis at the point $(b, 2)$. Find the value of a and b .
- B) The following frequency distribution shows the marks of the number of student in an exam :

Marks	0	1	2	3	4	5	6
Number of students	3	4	6	9	5	3	4

- Find the standard deviation of marks.

Fifth question :

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- A) If $x = \{1, 3, 5\}$ and R is function on x and $R = \{(a, 3), (b, 1), (1, 5)\}$
Find : (1) The range of the function.
(2) The value of $a + b$.
- B) If a, b, c and d are proportional quantities prove that $\frac{a}{b-a} = \frac{c}{d-c}$

انتهت الأسئلة

Calculator is allowed)

Answer the following questions:-

Question (1) : Choose the correct answer from those given:

The simplest dispersion measure is

- (a) the arithmetic mean (b) the median (c) the range (d) the Mode

$$2x^2 \times 3x^1 = \dots\dots\dots$$

- (a) $6x^3$ (b) $5x^3$ (c) $6x^2$ (d) $5x^2$

If $X = \{ 3 \}$, $n(Y) = 5$ then : $n(X \times Y) = \dots\dots\dots$

- (a) 1 (b) 5 (c) 8 (d) 15

The simplest form of the expression: $3x - 4y + 5x + 7y$ is

- (a) $7x + 12y$ (b) $11xy$ (c) $10x + 9y$ (d) $8x + 3y$

The relation which represents an inverse variation between the two variables y and x is

- (a) $xy = 5$ (b) $y = x + 3$ (c) $\frac{x}{5} = \frac{y}{2}$ (d) $y = 2x$

If $\sqrt{x} = 4$ then : $x = \dots\dots\dots$ where $x \in \mathbb{Z}^+$

- (a) 2 (b) 4 (c) 8 (d) 16

- Question (2):
- a Graph the curve of the function $f(x) = x^2$ where $x \in [-3, 3]$, from The graph find:
- (1) The maximum or the minimum value of the function.
 - (2) The equation of the axis of symmetry.
- b Find the standard deviation to the set of the values: 15, 19, 20, 21, 25.

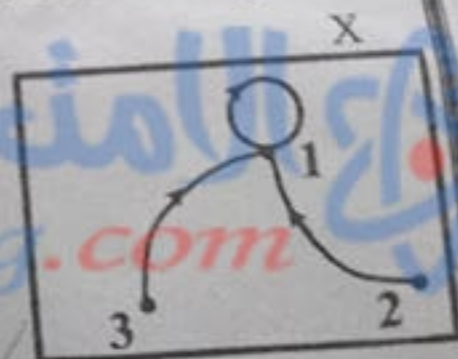
Question (3):

- a If $X = \{3, 4\}$, $Y = \{4, 5\}$, $Z = \{5, 6\}$ find:
- (1) $X \times Y$
 - (2) $(X - Y) \times Z$
- b If x, y, z and L are proportional quantities prove that: $\frac{y-x}{x} = \frac{L-z}{z}$

Question (4):

- a Find the number which if add to both of terms of the ratio $3:5$ then it becomes $1:2$ ~~$\frac{3 \times 5}{5}$~~

b The opposite figure: the arrow diagram represents the relation R on the set X



1- write R

2- Is R a function? if it's, find it's rang.

$$R = \{(1, 1), (1, 2), (1, 3), (2, 3)\}$$

Question (5):

- a If $y \propto x$ and $y = 20$ as $x = 4$ find:

- (1) The constant of variation between y and x .
- (2) The value of x when $y = 40$

- b If $f(x) = 2x + k$, $f(5) = 13$ find the value of k .

(انتهت الأسئلة)

(Calculator is allowed)

Answer the following questions:-

Question (1) : Choose the correct answer from those given:

- The simplest dispersion measure is
(a) the arithmetic mean (b) the median (c) the range (d) the Mode
- $2x^2 \times 3x = \dots\dots\dots$
(a) $6x^3$ (b) $5x^3$ (c) $6x^2$ (d) $5x^2$
- If $X = \{3\}$, $n(Y) = 5$ then : $n(X \times Y) = \dots\dots\dots$
(a) 1 (b) 5 (c) 8 (d) 15
- The simplest form of the expression: $3x - 4y + 5x + 7y$ is
(a) $7x + 12y$ (b) $11xy$ (c) $10x + 9y$ (d) $8x + 3y$
- The relation which represents an inverse variation between the two variables y and x is
(a) $xy = 5$ (b) $y = x + 3$ (c) $\frac{x}{5} = \frac{y}{2}$ (d) $y = 2x$
- If $\sqrt{x} = 4$ then: $x = \dots\dots\dots$ where $x \in \mathbb{Z}^+$
(a) 2 (b) 4 (c) 8 (d) 16

Question (2) :

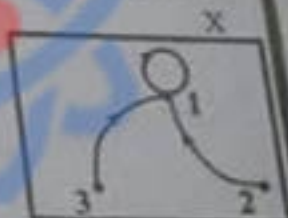
- Graph the curve of the function $f(x) = x^2$ where $x \in [-3, 3]$, from The graph find :
(1) The maximum or the minimum value of the function.
(2) The equation of the axis of symmetry.
- Find the standard deviation to the set of the values: 15, 19, 20, 21, 25.

Question (3) :

- If $X = \{3, 4\}$, $Y = \{4, 5\}$, $Z = \{5, 6\}$ find :
(1) $X \times Y$ (2) $(X \times Y) \times Z$
- If x, y, z and L are proportional quantities prove that: $\frac{y-x}{x} = \frac{L-z}{x}$

Question (4)

- Find the number which if add to both of terms of the ratio 3 : 5 then it becomes 1 : 2
- The opposite figure : the arrow diagram represents the relation R on the set X .
1- write R
2- Is R a function ? If it's , find it's rang.



Question (5) :

- If $y \propto x$ and $y = 20$ as $x = 4$ find :
(1) The constant of variation between y and x .
(2) The value of x when $y = 40$
- If $f(x) = 2x + k$, $f(5) = 13$ find the value of k .



المادة : الجبر والإحصاء (باللغة الإنجليزية)
الزمن : ساعتان

محافظة القليوبية
مديرية التربية والتعليم

امتحان الفصل الدراسي الأول للإعدادية العامة لعام ٢٠١٩ م

Answer all the following questions:

Q 1 : Choose the correct answer :-

1) $\sqrt[3]{x^6} = \sqrt{\dots}$

a) X^3

b) X^2

c) X

d) X^4

2) If: $(X + 5, 8) = (1, 6y + X)$, then $y = \dots$

a) 5

b) 6

c) 2

d) 12

3) The solution set of the equation: $X^2 + 4 = 0$ in R is \dots

a) 4

b) ± 2

c) -2

d) 0

4) If: $xy = 7$, then $y \propto \dots$

a) $\frac{1}{x}$

b) $x - 7$

c) x

d) $x + 7$

5) If: $x^2 - y^2 = 16$ and $x + y = 8$, then $x - y = \dots$

a) 2

b) 1

c) 128

d) 64

6) If: $\sum (x - \bar{x})^2 = 36$ to the set of 9 values, then $\sigma = \dots$

a) 2

b) 4

c) 18

d) 27

Q 2: a) Represent graphically the function f where $f(x) = (x - 2)^2$, $x \in [0, 4]$
From the graph, deduce:

1) The equation of the symmetry axis.

2) The maximum (minimum) values of the function.

b) If: $y \propto \frac{1}{x}$, and $x = 2\frac{4}{5}$ when $y = \frac{4}{7}$. Find the value of y , when $x = 3\frac{1}{5}$.

Q 3: a) If: $X = \{2, 3, 5\}$, $Y = \{4, 6, 8, 10\}$, and R is a relation from X to Y ,
where " $a R b$ " means " $2a = b$ " for each $a \in X$, $b \in Y$

1) Write R and represent it by an arrow diagram.

2) Is R a function?

b) If: a, b, c and d are proportional, prove that: $\sqrt[3]{\frac{5a^3 - 3c^3}{5b^3 - 3d^3}} = \frac{a + c}{b + d}$

Q 4: a) If: $X = \{2, 4\}$, $Y = \{4, 0\}$, $Z = \{4, 5, -2\}$

Find: 1) $(Z - Y) \times (X \cap Y)$ 2) $n(X^2)$

b) If: $f(x) = 4x + b$, $f(3) = 15$, Find the value of b

Q 5: a) If: $\frac{a}{2x + y} = \frac{b}{3y - x} = \frac{c}{4x + 5y}$, Prove that: $\frac{a + 2b}{7} = \frac{4b + c}{17}$

b) Find the standard deviation for this distribution:

X	Zero	1	2	3	4	5	Total
K	3	16	17	25	20	19	100

(انتهت الأسئلة)



Algebra and statistics

⌚ Time : 2 Hours

Answer the following questions

First question ⇒ Choose the correct answer:

① Double the number 2^8 is

- a) 2^{10} b) 2^{16} c) 4^8 d) 2^9

② If $xy = 3$ then $y \propto$

- a) x b) $3x$ c) $\frac{1}{x}$ d) $\frac{1}{3}x$

③ If $x^2 + y^2 = 25$, $(x+y)^2 = 49$, then $xy =$

- a) 6 b) 10 c) 12 d) 24

④ If $f(x) = 3$ then $f(3) + f(-3) =$

- a) 0 b) 1 c) -6 d) 6

⑤ $] - 2, 5[\cup \{-2, 5\} =$

- a) $[-2, 5]$ b) $[-2, 5[$ c) $] - 2, 5]$ d) $] - 2, 5[$

⑥ The range of the set of the values: 5 , 14 , 4 , 23 , 15 is

- a) 12 b) 14 c) 19 d) 23

Second question ↓

A) If $X = \{2, 5\}$; $Y = \{1, 2\}$, $Z = \{3\}$

then find: First: $n(X \times Z)$

Second: $(Y \cap X) \times Z$

B) If $f(x) = 4x + b$, $f(2) = 10$

then find the value of b .

Third question

- A) If $X = \{2, 3, 5\}$, $Y = \{4, 6, 8, 10\}$ and R is a relation from X to Y where $a R b$ means " $a = \frac{b}{2}$ " for each of $a \in X$, $b \in Y$ write R and represent it by an arrow diagram.
Is R a function? and why?
- B) Find the number which if added to the two terms of ratio $7 : 11$ it will be $2 : 3$.

Fourth question

- A) If $2a = 3b = 3c$ then find the numerical value of:

$$\frac{6a + b + c}{4a + 6b + 6c}$$

- B) Calculate the standard deviation for the following values:

55, 53, 57, 56, 54.

Fifth question

- A) If $y \propto x$ and $y = 6$ when $x = 3$ find:

First: The relation between x , y

Second: The value of y when $x = 4$

- B) Represent graphically the curve of the function

$f(x) = 4 - x^2$ where $x \in [-3, 3]$ and from the graph deduce the vertex of the curve and the equation of the symmetry axis.

Third Year Preparatory Examination
(First Term, January, 2018)

Algebra

Time : 2 Hours

Answer the following questions :

1

Choose the correct answer from those given:

- a The range of the set of values 8 , 2 , 5 , 9 and 6 equals (4 , 5 , 6 , 7)
- b If $4a - 3b = 0$ then $a : b =$ (3 : 4 , 3 : 7 , 4 : 3 , 4 : 7)
- c If $x - y = 2$, $x + y = 6$ then $x^2 - y^2 =$ (3 , 4 , 8 , 12)
- d If $\frac{y}{x} = 5$ then $y \propto$ ($\frac{1}{x}$, x , $\frac{1}{x^2}$, $x + 5$)
- e The fourth proportional of the numbers 2 , 3 , 4 is (6 , 7 , 8 , 9)
- f If $(3^x, \sqrt{y}) = (1, 4)$ then $x + y =$ (2 , 3 , 16 , 17)

2

a If $X = \{3, 4\}$, $Y = \{4, 5\}$, $Z = \{5, 6, 7\}$.

Find: (1) $X \times (Y \cap Z)$. $\{(3, 5), (4, 5)\}$ (2) $n(Y \times Z)$. 6

b If a , b , c and d are proportional quantities then Prove that: $\frac{a^2 + c^2}{b^2 + d^2} = \frac{ac}{bd}$ m^2

3

a If $X = \{1, 2, 3\}$, $Y = \{3, 4, 5, 7\}$ and R is relation from X to Y where $a R b$ means : $b = 2a + 1$ for each $a \in X$, $b \in Y$. $\{(1, 3), (2, 5), (3, 7)\}$

Write R and represent it by an arrow diagram. Is R a function? Yes, because And Why?

b If $y \propto \frac{1}{x}$ and $y = 3$ when $x = 4$.

Find: (1) The relation between x and y . $y = \frac{12}{x}$ or $xy = 12$
(2) The value of x when $y = 6$. 2

4

a If the point $(2, 5)$ is located on the straight line represented to the function $f : R \rightarrow R$ where $f(x) = kx + 3$. Find the value of k and Find the point of intersection of the straight line by the x -axis $(-3, 0)$

b Represent graphically the curve of the function f where : $f(x) = x^2 + 2x + 1$ taking $x \in [-4, 2]$ and from the graph deduce:

- (1) The vertex of the curve . $(-1, 0)$
(2) The maximum or minimum value of the function. -1
(3) The equation of the line of symmetry. $x = -1$

5

a If b is the middle proportional between a and c , prove that $\frac{a-b}{a-c} = \frac{b}{b+c}$. $\frac{m}{m}$

b Calculate the standard deviation for the values : 16 , 32 , 5 , 20 , 27 .

$\bar{x} = 20$ $\sigma = 9.3168$

انتهت الأسئلة " مع أطيب التحيات بالتوفيق "



Giza Governorate
The Educational Directorate
The Completion of Basic Education Certificate Exam
First Term 2017/ 2018

جبر ٤ - ع - الفصل الأول



Algebra and statistics

⌚ Time : 2 Hours

Answer the following questions

First question \Rightarrow Choose the correct answer:

- ① If $x = 3$, $y = 5$ then find the value of $y^x = \dots\dots\dots$
a) 15 b) 243 c) 125 d) 8
- ② The range of the set of the values 45 , 75 , 65 , 95 , 35 , 55 equals
a) 30 b) 40 c) 50 d) 60
- ③ The value of $(\sqrt{5} - 3)(\sqrt{5} + 3) = \dots\dots\dots$
a) -4 b) 4 c) 2 d) 8
- ④ If y varies inversely with x then
a) $y = x$ b) $y = mx$ c) $x = my$ d) $y = \frac{m}{x}$
- ⑤ If the radius of a sphere 3 cm then its volume = cm^3
a) 4π b) 36π c) 36 d) 27π
- ⑥ If the point $(a - b, 5)$ is located on the Y-axis then
a) $a = b$ b) $a + b = 0$ c) $a \neq b$ d) $a - b = 5$

Second question \Downarrow

A) If $(x - 2, 3) = (5, 3y + 1)$ then find the value of x, y .

B) If $a \propto b$ and $a = 3$ when $b = 2$ Find:

1) The relation between a, b .

2) The value of a when $b = \frac{2}{3}$

Third question ↓

A) If $X = \{3, -2\}$, $Y = \{1, -4, 5\}$ find:

$$\frac{3 + 2 + 5}{9}$$

1) The cartesian product $X \times Y$.

2) Represent the cartesian product by a cartesian diagram.

B) If $\frac{a}{2} = \frac{b}{3} = \frac{c}{4} = \frac{3a - 2b + 5c}{5x}$ find the value of x .

Fourth question ↓

A) If $X = \{1, -2, 3\}$, $Y = \{-8, -2, 2, 8\}$ and R is a relation from X to Y where $a R b$ means " $b = 2a - 4$ ", for each $a \in X$, $b \in Y$ then:

First: Represent an arrow diagram of R .

Second: Show that why R is a function from X to Y .

Third: If $a R 8$ then find a .

B) If $5a = 3b$ then find the value of $\frac{7a + 9b}{4a + 2b}$

Fifth question ↓

A) The following frequency distribution shows the ages of 10 children

Ages in year	5	8	9	10	12	Total
No. of children	1	2	3	3	1	10

Calculate the standard deviation to ages in years.

B) Represent graphically the quadratic function f where:

$$f(x) = x^2 - 4x + 3, \quad x \in \mathbb{R} \quad \text{where } x \in [-1, 5]$$

then find: 1) The equation of the symmetry axis.

2) The minimum value of the function.



**CERTIFICATE OF
COMPLETION OF THE STUDY
OF THE BASIC EDUCATION
STAGE
THE THIRD YEAR PREPARATORY**

The Directorate of Education

First term - Jan. 2018

subject: algebra & statistics

الجبر والإحصاء
(مترجم إلى الإنجليزية)

Time : 2 hours

Answer all questions

Calculator is permitted

Questions in two pages

Q(1):

A : choose the correct answer from those given:

1- If $x = \{1, 3, 5\}$: R is a function on X :

$R = \{(A, 3); (B, 1); (1, 5)\}$ then $A+B =$ _____

A) 4 B) 6 C) 8 D) 2

2- If $(L - 3, 2)$ lies in first quadrant, then L may be equal _____

A) $\frac{1}{2}$ B) 2 C) 7 D) 0

3- If $2A = 3B$, then $\frac{A}{B} =$ _____

A) $\frac{3}{2}$ B) $\frac{2}{3}$ C) $\frac{9}{4}$ D) $\frac{4}{9}$

B) If $X^2 Y^2 - 4XY = -4$, prove that : x varies inversely as y .

Q(2):

A) Choose the correct answer from those given :

1- The simplest dispersion measurements is _____

[The arithmetic mean or The Standard deviation or The median or The range] 0

2- If $(a; 2) \in$ straight line $Y = 3X - 4$, then, $a =$ _____

[2 or 3 or 4 or 7]

3- If $n(X) = 2$, $n(X \times Y) = 8$, then $n(Y^2) =$ _____

[4 or 2 or 16 or 8]

B) Which number added to terms of ratio 7 : 12 to become 2 : 3 ?

CONT.

**CERTIFICATE OF COMPLETION OF THE STUDY
OF THE BASIC EDUCATION STAGE
THE THIRD PREPARATORY**

JAN. 2018 - Algebra & statistics

THE SECOND PAGE

Q(3):

A) Find standard deviation for values 2, 5, 6, 8, 9.

B) The straight line which represent $F : R \rightarrow R$, where

$F(x) = 3x + a$ cut y-axis at point $(b, 7)$.

Find the value of : $2a - 5b$.

Q(4):

A) If : $\frac{A}{4} = \frac{B}{5} = \frac{C}{3}$, Prove that : $\frac{A+B+C}{A+B+C} = \frac{1}{3}$.

B) If $X = \{1, 2\}$; $Y = \{0, 2, 3\}$ R is A relation from $X \rightarrow Y$ such that aRb means " $a + b =$ prime number" for each $a \in X$; $b \in Y$, write R , represent it by arrow diagram, is R function ? or not ?

Q(5):

A) If $(3 - x, y + 2) = (-4; 4)$, find the value of $\sqrt{x+y}$.

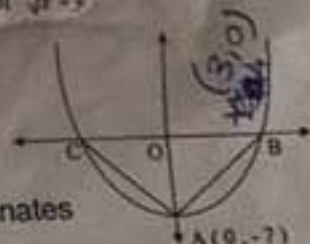
B) The opposite figure represent function

$F(x) = Lx^2 - 7$, the area of triangle

$\Delta ABC = 21 \text{ cm}^2$, $A(0, -7)$ find coordinates

of point B then find the value of L .

The end of questions



Subjects

Algebra & Statistics



Cairo Governorate
Cairo Educational Directorate
The Completion of the Basic education
certificate Exam First term 2017 - 2018

Time:

2 Hours

امتحان شهادة إتمام الدراسة لمرحلة التعليم الأساسي - الفصل الدراسي الأول ٢٠١٧ - ٢٠١٨ م
الزمن : ساعتان

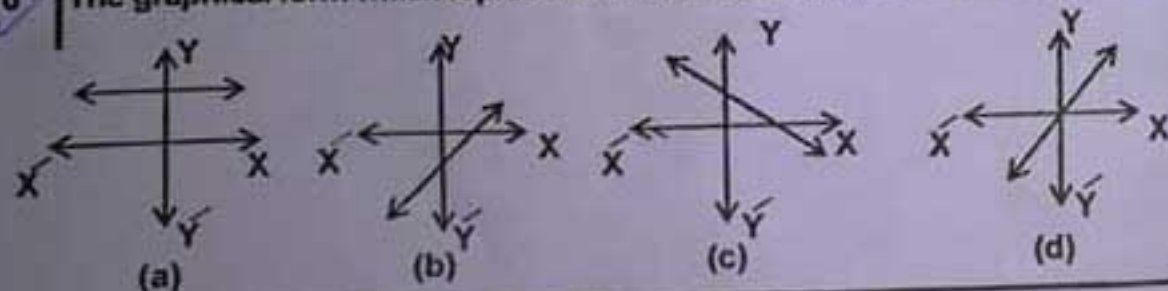
يسمح باستخدام الآلة الحاسبة

(Calculator is allowed)

Answer the following questions:-

Question (1) : Choose the correct answer from those given:

- 1 If : $n(X) = 3$ and $n(X \times Y) = 12$, then $n(Y) = \dots\dots\dots$
(a) 4 (b) 9 (c) 15 (d) 36
- 2 The arithmetic mean of the set of values : 2 , 3 , 4 , 6 , 10 is.....
(a) 4 (b) 5 (c) 8 (d) 25
- 3 If the point (5, b - 7) lies on X- axis , then b =.....
(a) -2 (b) 2 (c) 7 (d) 12
- 4 If : $f(x) = 3$, then $f(-5) - f(5) = \dots\dots\dots$
(a) 6 (b) 1 (c) zero (d) -1
- 5 If : a , 3 , b , 5 are proportional quantities, then $\frac{a}{b} = \dots\dots\dots$
(a) $\frac{3}{5}$ (b) $\frac{5}{3}$ (c) 2 (d) 8
- 6 The graphical form which represents the direct variation between X and Y is : ...



Question (2) :

- a If : $(x^5, y - 1) = (32, \sqrt[3]{27})$, then find :

The value of each x and y

(بقية الأسئلة في الصفحة المقابلة)

- b If $X = \{1, 2, 3\}$, $Y = \{12, 47, 53\}$ and R is a relation from X to Y where aRb means "a is a digit from the digits of b" for all $a \in X, b \in Y$.

- (1) Write the relation R and represent it by an arrow diagram.
- (2) Show that R is a function from X to Y then find its range.

Question (3) :

- a If : $\frac{a}{2} = \frac{b}{5} = \frac{c}{7}$, then prove that $\frac{5b - 3c}{2c - 3a} = \frac{1}{2}$

- b Graph the curve of function f, where $f(x) = x^2 - 2x$ in the interval $[-2, 4]$, from The graph determine :
(1) The minimum value of the function.
(2) The equation of the axis of symmetry of the curve .

Question (4) :

- a If b is the middle proportional between a and c, then :
prove that : $\frac{a^2 + b^2}{b^2} = \frac{b^2 + c^2}{c^2}$
- b If the point (a, 3) lies on the straight line which represents the function $f(x) = 4x - 5$, then find the value of a .

Question (5) :

- a If y varies directly as x and $y = 6$ as $x = 2$ find :
The relation between x and y, then find The value of y when $x = \frac{1}{3}$
- b The following tables shows the distribution of ages of 10 children in years :

The age in years	5	8	9	10	12	Total
Number of children	1	2	3	3	1	10

Find the standard deviation of the ages in years.

(انتهى الأسئلة)